SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

THE MANUFACTURING INDUSTRY OF SCOTLAND.

THE NEWHALL FACTORY, GLASGOW.

It may not be generally known that Glasgow, the commercial metropolis of Scotland, contains some of the largest cotton factories in the world. People are too much accustomed to associate the industrial relations of Glasgow with coal, iron, and shipbuilding, to the exclusion of other manufactures, which, although they may not figure so prominently in the statistical returns, are really of no less importance and weight in the way of contributing to her exceptional prosperity. The works of Messrs. JOHN ROBERTSON and Co., at Bridgeton, are quite unique of their kind, and furnish, perhaps, as bright an example as it would be possible to adduce of the material progress of the city. Mr. Robertson's first mill was established at Rothsay, the Montpelier of Scotland. Various drawbacks to the due progress and development of his business in that popular watering place induced Mr. Robertson to open another mill in the Calton, in Glasgow, and for a number of years both mills were carried on with a considerable amount of success. About eighteen years ago, however, another factory of still larger dimensions than either of the other two, and with every improvement which modern science and mechanical ingenuity could suggest, was built at Greenhead, on the north bank of the Clyde, and ever since that time Mr. Robertson has devoted the whole of his vast practical experience to the expansion and improvement of his Bridgeton mills. About three years ago he acquired the factory of Mr. Scott, of Kelly, adjoining his own, and the two establishments combined now form one of the largest and most complete factories of its kind in the kingdom.

The Newhall Factory, as it now stands, covers about 10 acres. It contains 150,000 spindles and 3200 power looms. Not less than 3000 hands are employed, the great majority being women. Motive-power is supplied to the machinery by four pairs of engines, the largest being 800 indicated horse-power, 48 in. diameter of cylinder, and 6 ft. stroke. These engines work up to a pressure of 40 lbs. They were built about 12 years ago by the well-known firm of Messrs. Musgrove and Son, of Bolton. The monster fly-wheel weighs 40 tons, and the other parts are in the same proportion. There are two other pairs of engines, the one horizontal and the other beam, driving off the same shaft, and of 400 indicated horse-power. They are fitted with Corlis valves, an American invention, which is coming into pretty general use in Scotland, and with the action of which many of our readers will be familiar. In regulating the speed of the engine with the throatle-valve, a difficulty has long been felt in obtaining the fullest expansion of the steam, the valve being placed so far from the cylinder; but the Corlis valve, which resembles a large stop-cock, is shut by means of strong springs, and effectually prevents the wire drawing of the steam. It is now some six months since the Corlis valve was attached to these engines. The third pair of engines are of 800-horse power indicated, and constructed on M'Naught's principle. They have a 40-inch and 32-inch cylinder each, 6-ft. stroke, and work at 40 strokes per minute, with a pressure of 50 lbs. To supply the engines with steam there are no less than 20 large boilers on the works. Five of them are Galloway, and the rest are Cornish two-flued boilers, and they consume, when in full work, about 60 tons of coal per day.

Although the Newhall Factory is altogether on a colossal scale, its most distinguishing feature is the weaving sheds, three in number, the largest of which covers 54,450 square feet of ground, or nearly an acre and a half. In this single department there are between 800 and 900 operatives, and from 1400 to 1500 looms. It is constructed with the most punctilious regard to due ventilation and light. The roof is in six spacious bays, running from east to west, and the light, which is reflected through the southern half of the bay, is so arranged that the sun can never affect the optics of the workers. Each division of the roof is supported on a series of light, graceful iron pillars, and the *tout ensemble* of the place is strikingly effective and interesting. No girls are admitted under the age of 13, and all new applicants for work must produce a medical certificate of physical competency. The more experienced workers are allowed the control of two looms, but the younger operatives can only manage one. We remarked in the course of our visit that the great majority of the women were barefooted; but all of them looked clean and well, and not a few were really prepossessing. Hoary-headed matrons were plying their vocation side by side with children of the tenderest admissable age; and all alike were thoroughly intent on business, the character of their labour, not less than the conditions of their remuneration, entailing constant and undivided attention. It is worthy of remark that the belting and other gearing connected with this shed is all below ground, so that there is no obstacle in the way of the eye while ranging over the vast expanse of looms and human faces; and the whole scene, with its varied and picturesque accessories, is one which those who have witnessed it will not readily banish from their memory. Seen by gas-light the view is still more impressive.

There are upwards of 800 jets of gas in the apartment, making an average of one jet for every two power-looms. The looms are erected in pairs, with convenient passages intersecting each row. Of the other two weaving-sheds, we may remark that one, 240 ft. in length, by about 200 ft. in breadth, is quite a recent erection, and has not yet been quite fitted up; the other, which contains 800 looms, was acquired along with the other premises connected with Mr. Scott's factory, and was honoured with a visit from the Prince of Wales some few years ago. All the weaving-sheds are built on the same principle, but in the two latter the gearing is above the looms, and this presents a striking contrast to the arrangement of the first shed. Spacious store-rooms adjoin each of the weaving-sheds, where the products of manufacture are prepared, either for further maninipulation or for the market.

There are two large spining-mills, each four storeys in height, connected with the Newhall Factory. They are situated at opposite corners of the establishment, and, although they are within easy access of one another there is a different public entrance for each, the one which formerly belonged to Mr. Scott being approached from John-street, while the original mill of the Messrs. Robertson is entered from Greenhead-street. In addition to 150,000 spindles which run off thread at the rate of 300 miles per minute, the mills contain a great variety of "scutching" and other machinery. The general process of cotton spinning is so well known that any exhaustive description of it would be quite unnecessary in an article like this. Briefly, however, we may state that the cotton is received in bales at the factory, and it is first passed through a curious machine called an opener, by means of which the fibres are loosened and partially separated from the sand, seed, or leaves that have attached to it in the fields. "Scutching," by which the cotton is still further freed from extraneous matter, and delivered in the form of a web or "lap" is the next process. A large fan, not unlike a paddle-wheel, is the instrument used in the "scutcher" to clean the cotton, which after three different "scutchings" looks quite unlike its former self. The premises devoted to "scutching" operations are made fire-proof, there being sometimes combustible materials among the cotton before it is thoroughly cleaned, and in the course of "scutching" there is great danger of ignition.

The third process is known as "carding," and it consists in combing the fibres, and laying them parallel together, while the refuse is entirely separated. In close proximity to the "carding" machinery the "drawing," or fourth process, is carried on. It consists in drawing out about 100 ribbons, or "slivers," so as to form but a single ribbon, thus equalising the quality, and laying the fibres still more parallel. During the three subsequent stages of their progress the "slivers" produced by the drawing frame are reduced, and fitted for the mule or throstle frame, being slightly twisted at each turn, while the cotton ultimately forms a warp cop, which after being wound first on bobbins, and next on beams, is strengthened by starch for being woven.

Of the other accessories of Newhall Factory we need say but little. Its situation at the east end of the green is admirably open and airy, and all the rooms are so lofty and ventilated that they present a most agreeable contrast to some other establishments of a similar kind. A cooking depôt has been fitted up on the premises, where those operatives who may happen to reside at some distance from their work can be supplied with their meals; and there is likewise a meeting-house, or chapel, which is sometimes used for devotional and sometimes for recreative purposes. Telegraph wires connect the different parts of the factory with each other, and a wire communicates directly with the General Post Office in George-square. Steam-pipes run throughout the whole establishment, which is thus abundantly heated during the winter. Large stores and ample mechanics' shops, where joiners, tinsmiths, and other operatives, are regularly employed, are also included in the premises.

MANUFACTURING INDUSTRY OF THE NORTH OF ENGLAND.

THE TEES ENGINE WORKS.

Having given a description of the Blast-Furnaces and Rolling-Mills at the Teesside Ironworks, in the *Mining Journal*, of Oct. 1, 1870, we now propose to give a brief description of the engineering works belonging to the same firm (Messrs. HOPKINS, GILKES, and Co.), situated in Middlesborough. The engine works were founded in the year 1846, but since that time have so increased in extent that they are now intersected by two main streets of the town, forming three separate yards. The manufactures of this establishment are of so varied a character, requiring so many appliances in connection with them, that a few of the main features of the works only can be given. Locomotives of great power have been turned out here, as well as many of a smaller type, and stationary steam-engines. Bridge and girder work is extensively carried on, and the foundry department is in full activity, for which several large buildings are erected. On entering the south yard from Commercial-street a range of buildings, two stories in height, forming one side of that street, comprise storehouses, engineers, and drawing offices, joiners, pattern-making, and wagon shops, the latter contains machine-saws, and other wood machinery. The whole range is surmounted by a pattern-loft, containing a large number and variety of patterns. The centre of the south yard is almost entirely taken up with gantries, and cleaning benches, and storage room for pipes and other castings, and by the pipe-testing machines, and the pits where they receive their protective coating. Along the western side of this yard are built a fine range of fitting and smiths' shops, in which every kind of engine work is carried on. The fitting-shop is provided with powerful travelling cranes over the larger of the machines. Of the machines the most noteworthy is a face lathe, capable of turning rings, furnace-bells, &c., up to 16-feet in diameter. There are here also numerous smaller lathes, planing, and slotting machines, all of which are driven by a 15-inch horizontal engine. This engine also drives the fan which supplies blast for the fires in the smiths' shop adjoining—there are 26 fires, most of which are in operation. This yard is bounded on the south by the large pipe foundry, in which pipes are manufactured varying from 1½ inch to 36 inches in diameter; this foundry alone is capable of turning out about 200 tons of pipes per week; all those of large size (above 6-in. diametor) being cast vertically. The pipe foundry is divided into two portions; first, where the pipe moulds are constructed and blacked; secondly, where the cores and loam cakes are made.

Between these two portions, and with doors opening to each, are placed the vertical stoves in which the moulds are dried. Each pipe mould is carried on an independent wagon or bogie, running on the rails with which the pit is laid from end to end. In order further to economise labour the pipe patterns are lifted from the moulds by engine power. By means of shafting the engine (a 16-in. horizontal cylinder) is utilised for lifting in every part of the foundry. It works a large crane at the core end, and blows air to the melting cupolas. The pipes are lifted out of their boxes when cast by another steam-crane with separate engine, which places them at once upon the yard railway. Two cupolas are required for this foundry, and the materials (iron, coke, and limestone) are raised to the top of them by an inclined plane worked by the horizontal-engine.

Leaving this yard, and crossing Grey-street, we enter the bridge and boiler-yard, which is several acres in extent. The south portion is covered by a long, wide shed, in which are placed the smiths' fires and most of the machinery. The machines comprise six large punching and shearing-machines, two large plate-bending machines, a straightening-machine, a steam-striker, and a variety of multiple drilling-machines, both travelling and stationary. There are seven engines in this department to drive the machines. The other parts of the yard are in general occupied by work in course of construction, and to a large extent covered overhead by travelling cranes.

On the north side of Commercial-street is another yard and buildings, consisting of three foundries and fitting shops. Most of the general work is done here. The larger foundry is furnished with three powerful hand-cranes, one of which is capable of lifting 15 tons. One end is set apart for loam work, and has drying stoves adjoining. There is a tubbed pit 16 ft. in diameter and 16 ft. in depth. A 16-in. horizontal-engine drives the fan to supply blast for smelting, and a loam-mill. In this yard there are two other foundries, one of which is adapted for heavy loam and sand work, the other for wheel work and sundry small castings, as is also a foundry in the south yard we omitted to mention. The fitting-shops in the north yard are two storeys in height, the upper storey containing the lighter machinery, including hand-lathes, small self-acting lathes, planing, screwing, and drilling-machines. In the lower storey are placed the heavier machines, and driving-engine for the whole of 14-in. cylinder. Near the river Tees, at the west side of Vulcan-street, and adjoining to Messrs. Bolckow, Vaughan, and Co.'s property, there is another yard belonging to this company. The yard is used as a storage place for pipes, and for several thousand tons of foundry boxes. A small forge is also erected, from which the engine works are supplied with axles and various other forgings. Having good river frontage, and being provided with steam and hand cranes, this yard is well adopted for storage and for the shipment of goods.

BIRMINGHAM, AND THE BLACK COUNTRY.

THE INTENDED VISIT OF THE IRON AND STEEL INSTITUTE TO STAFFORDSHIRE.

As it is now well understood, the members of the above institute hold their next general meeting at Dudley, in South Staffordshire. Aug. 29 and three following days are those fixed upon for the visit, and the mornings of Tuesday and Wednesday will be spent at the hall of the Mechanics' Institute, where interesting papers will be read and discussed. The afternoon of each day will be employed in visiting the most important ironworks in the neighbourhood of the town. Thursday will be spent in Birmingham, where the members will be entertained by the South Staffordshire Iron and Allied Trades. On Friday excursions will be made to the outlying works, and it is not unlikely but that the Northamptonshire mines may be visited on Saturday. It is expected that the members of the Northern Mining Institutes will also avail themselves of this opportunity to visit the district, and they will be received by the Dudley Mining Engineers, and shown several specimens of mining enterprise that will no doubt prove entertaining. It is our intention to publish a series of papers, that will give detailed descriptions of the works and collieries to be inspected, and prove a guide to the members and their friends, by which they will be informed of all the principal and important features at each place to be visited. In commencing it will not, perhaps, be out of place to give a brief *resume* of the history of the Iron and Steel Institute. It has but recently been organised, and is the youngest technological society. The iron and steel trades are, perhaps, the most important branches of our national industries, and hold a foremost place amongst our staple manufactures. It was for some time felt that the existing technological institutions did not fully meet the requirements of the iron trade. Anyone having a communication to bring before iron and steel makers had to consider whether he would ask the Civil or Mechanical Engineers, the British Association, or some local scientific society to take up the subject; and, probably, when he found some institution willing to receive his paper, was compelled to introduce it to an audience having little interest in the matter, and quite incapable of appreciating the merits of the contribution. The attention of the ironmasters in the North of England was called to this state of things, and a paper was read at a meeting of the trade, held at Newcastle-on-Tyne, in October, 1868, by Mr. John Jones, formerly secretary to the Staffordshire Iron Trade, but at that time occupying a similar position in the North. In this paper it was suggested that steps should be taken for establishing a technological institution for the iron and steel trades alone.

A meeting of representative men from the principal iron districts was soon after held in Birmingham, where the proposal was warmly received, and the organisation of the Institute proceeded with. The Duke of Devonshire—a nobleman largely connected with the iron trade of the hematite district—consented to become first President, and the inaugural meeting took place in London about the middle of 1869, the number of members at that time being about 150. According to the constitution of the society, it was arranged that the meetings should be held alternately in London and the provinces. The first provincial meeting was held in Middlesborough in the autumn of 1869. Last year the summer gathering took place in connection with the iron trade of South Wales, Merthyr Tydvil being the place of meeting. At the last meeting, held in London a few months ago, Mr. Henry Bessemer, whose name is identified with one of the best inventions connected with the modern iron trade, was elected President, and it was then decided to hold the next provincial meeting in South Staffordshire, the ironmasters having given the Institute a cordial invitation. At the forthcoming meeting two papers at least of great importance to those interested in the manufacture of iron will be read. The first will be by a gentleman who professes to have solved the difficult question of mechanical puddling, and he will explain his rotary furnace, which, it is said, promises to become a great success, and will revolutionise the present mode of manufacturing iron. The second paper will be read by Mr. Howatson upon his Patent Puddling and Heating Furnaces. The object of the patent is to supply hot instead of cold air to the fires of furnaces, whereby a great saving of fuel and iron is accomplished, and there is less wear and tear upon the brickwork. New furnaces can be built upon the improved principle, or the old ones can be altered to it at a very small cost. After the paper is read the company will have an opportunity of seeing some of these furnaces in actual work at the Earl of Dudley's works, where they have been thoroughly tested, and the results have been somewhat remarkable.

We will now commence the description of the works to be visited. The first are nearly sure to be the Round Oak Works, and of these we gave a full description in the Supplements to the *Mining Journal* of December 3, and 10, 1870, but as the matter possesses more than an evanescent interest, indeed will be of much present value, as a guide to the visitor, we will briefly recapitulate the chief points. The Earl of Dudley's Round Oak Ironworks are situated at Brierley Hill, about two miles from Dudley, close to the side of the Great

Western Railway, and have the canal at their rear, so that they stand well as regards means for transit of material. This is the model establishment of South Staffordshire, and from it is produced some of the best iron in the world. Perhaps it would be well here to give an account of the Earl's connection with Dudley, and his reason for erecting the Round Oak Works.

Almost the whole of the land and minerals lying within a circle of five miles around Dudley are the property of the Earl, and under the control of his head agent, whose residence and offices are at the Priory. The whole of the space mentioned is extremely rich in the raw material of which iron is made, perhaps more so than any other spot on the earth's surface; but of the geological structure we shall speak in another article. But the resources of this vast estate were never to any great extent developed till the time of a late agent, Mr. Richard Smith. This gentleman was ably supported by his son, Mr. Frederick Smith, who at the retirement of his father took the reins, and carried on the great work, and by Mr. E. Fisher Smith, the then agent for the east side of Dudley, but now chief agent. The latter gentleman is very much esteemed by the agents and others under him, for, although he uses his most strenuous endeavours to further the interests of the Earl, he considers and justly values those over whom he has control. The name of Smith will ever be historically connected with the iron trade of South Staffordshire, for not only by the Smiths has a considerable portion of the rich treasures buried low in the bowels of the centre portion of this wonderful little island of ours been discovered and brought to the surface, but these they have formed into a substance which has saved the reputation of Staffordshire, and gone forth to every portion of the globe, showing the world that this country has the material, industry, and skill wherewith to make iron that defies competition. The object in building the Round Oak Works was not to use the great advantages of the Earl so as to make iron that would push the produce of other neighbouring ironmasters out of the market, but to make it of a quality never before equalled, and such as would be suitable for certain purposes. In proof of this, we may say that the Earl's iron is always above the list price.

Another main reason for the erection of these works was that the large quantity of minerals raised from the estate might be reduced to such a form as to render them marketable in places where it would be impossible to dispose of the raw material. This district is a vast source of wealth to the Earl of Dudley, and this fact he always keeps in view, as is clear from the many munificent gifts he has bestowed upon Dudley and its environs. The architecture of the Round Oak Works is everything that could be desired; they not only have a fine appearance, such as is seldom or ever seen in the Black Country, but are built in a manner that is best suited to the laying out of the internal machinery. The centre portion is occupied by two forges, and on each side of these are the mills; in close proximity to the mills are two extensive warehouses for the stocking of the finished iron, and these warehouses form the extremities of the front of the works. They are built in a very substantial manner, of red bricks, faced with white, and the eaves of the slated roofs are terminated by cast-iron spouting of a very handsome pattern. The boiler-houses, three in number, having the large stacks in front of them, are at the back, and the whole of the body of the works is covered by a series of slated roofs, supported upon ornamental cast-iron columns. In the centre of the front of the works is a neat little building, used as the timekeeper's office. At the back of this office are two forges, having about 14 puddling-furnaces each. The machinery consists of two helve-hammers, two forge trains, and several pairs of shears. These are driven by a high-pressure horizontal engine, having a cylinder 30 in. in diameter, and working a 3-ft. stroke. Steam is supplied from five cylindrical boilers.

A large 4-ton Kirkstall Forge Company's steam-hammer stands in the forges. At the top end of the works is a 16-in. mill and a large plate-mill driven by an engine similar in every respect to that in the forges. In the plate-mill there is a large pair of lever shears, and in the 16-in. mill a Smith's steam-saw for cutting the ends of the plates, bars, &c. Below the forges is a 12-in. mill, and it is at one of the heating furnaces here that the application of Howatson's patent has been so successful, so much so that nearly 6 tons of coal and over 1 ton of iron have been saved in a week; but a full description of this patent will be found in the *Mining Journal* of July 1. The 12-inch mill is driven by a high-pressure vertical engine, with cylinder 24-in. diameter, and a stroke of 2 ft., and on the other side of this engine is an 8-in. mill. A Smith's steam-saw and small shears cut the ends of the bars. A horizontal engine, with a 20-in. cylinder and 3-ft. stroke, works a 7-in. mill and a hoop mill. At the back of the works there is a roll-turning shop, and carpenters' and blacksmiths' shops. There is also a large roll store, so arranged that any roll can be found and brought into the works in a few minutes. An hydraulic lift raises the pig-iron from the boats in the canal to the level of the works, but there are two wharves reached by inclines. The cinder from the puddling and heating furnaces is calcined in five large "bull-dog" kilns, and afterwards withdrawn and ground in a mill driven by a small horizontal engine.

The Round Oak New Forges, which are situated near the other works, have been built about six years, and were erected with the object of making a sufficient supply of puddled bars to keep in advance of the work. These forges are laid out upon a good principle. The puddling-furnaces, 28 in number, are arranged in a semicircle, the engines, forge trains, helves, &c., being placed as near as possible about the centre of the diameter. By this plan all the furnaces are at almost an equal distance from the helves, and yet all are as near as it would be advisable to get them. The advantage of this will be seen, for there is no confusion. A puddler when drawing his heat does not have to cross the standing place of another in order that he may get his balls to the helve. He has only a short distance to take them over a perfectly clear space, and they are, consequently, soon under the helve, and are little subjected to the oxidising effect of the atmosphere. The forge engines are vertical, and placed side by side; they have cylinders 27 in. in diameter, and work a stroke of 2 ft. 4 in. Steam is supplied from six cylindrical boilers, 35 ft. long by 5 ft. diameter, which are some distance behind the engines, and clear of the works. To each engine there is a forge-train, helve, and pair of shears. The works have been much improved by Mr. R. Smith Cassons, the present manager, during his term of office.

Large quantities of puddled steel, or crystalline iron, are made at the Earl's works, and of such a quality that it has for certain purposes supplanted cast-steel. The iron made here, we believe, was awarded the first prize at both the Paris and the 1862 Exhibitions. The samples of iron at the works showing the tests to which it can be put, are a complete study. A handsome suite of offices, capable of accommodating about 40 persons, stands near the works, and answers not only for them, but for a portion of the collieries. We hope next week to give a description of the blast-furnace plants, for these are by far the finest in South Staffordshire.

FURNACE FOR MELTING ORES AND METALS.—The invention of Mr. W. S WOOD, Newtown, New York, relates to a new and important improvement in the process of melting iron in cupolas, or melting pots, which, it is claimed, has demonstrated its utility in actual use. It consists in allowing one or more currents of air to enter the cupola or pot above the tuyere, during the process of melting, thus supplying an additional quantity of oxygen to the carbon in the cupola, thereby converting the carbonic oxide evolved into carbonic acid, greatly increasing the temperature in the furnace by producing a more perfect combustion, and consequently more perfectly liquefying the iron. One or more pipes are introduced into the cupola, at any point above the tuyere, and either above or below the feed door. Each has a funnel attached to it, the lower end of which extends to near the floor, or as low as may be found desirable. The upward rush of the gases in the cupola, produced by the blast below, causes a strong draft of air through the pipe into the cupola, producing the results before stated. By this simple device it is claimed that the iron is rendered more fluid, its quality is improved, and certain castings, which have hitherto baffled the most skilful foundrymen, are produced with the utmost ease, sound and perfect in all respects.

MOTIVE-POWER.—The invention of Mr. O. TROSSIN, 4, Museum-street, consists in the application of heated compressed gas as motive-power. In a furnace provided with a grate and door is a closed cylindrical vessel of iron, the right hand bottom of which has a large round opening in its centre, which is closed inside of the vessel by a round plate, on which is fastened a thick round plate of plaster. From the centre of the plate leads a short rod. This rod is fastened in the centre of the bottom of a cylinder, which is closed only at one end. The side walls of the cylinder are double, and separated by an intermediate space filled up with ashes. In the middle of the bottom of the cylinder there are round the rod four openings closed by the valve. Round the plain outer surface of the cylinder is placed a ring consisting of four pieces, which are pressed by springs against the cylinder. Between the plate and the bottom of the cylinder there is fastened on the rod a round plate, to retain the warmth that might go through the plate off the bottom of cylinder. The cylinder is surrounded by another cylinder, fitting almost tightly, and being in gas-tight connection with the vessel. In the interior of the cylinder is a third cylinder, also fitting almost tightly, and filled up with a bad conductor.

SOUTH WALES STEAM COAL COLLIERIES' ASSOCIATION.

SIR,—May I ask you to insert the enclosed resolution of a meeting of the Coal Trade (which was held yesterday at the George Hotel) in next week's issue of your Journal? A. DALZIEL, Sec.

Cardiff, July 14.

"Resolved that the offer to refer all matters in dispute between the proprietors and their men on strike to arbitration, made on June 14 last, be adhered to and repeated; or, in the alternative, the said proprietors do offer to resume the working of their pits at a reduction of 7½ per cent. on the prices paid during the month of May last, upon condition that both parties be bound to such arrangement for twelve months; but should the ironmasters of the Merthyr and Dowlais districts advance the prices of labour during such twelve months beyond the prices hereby offered, the coal proprietors shall give an equivalent advance."

"Resolved that this meeting be adjourned till Thursday, the 20th of this month, in order to afford the workmen time to give their definite reply."

The result of the meeting was that in the event of the men refusing to accept either of the alternatives offered them, or declining to make any reply before the 20th of this month, steps will be taken to introduce fresh men into the collieries. For this purpose a committee was appointed to make enquiries in each of the collieries and mining districts of Great Britain. The report of the committee will be laid before the proprietors at their adjourned meeting.

BRIGGS'S CO-PARTNERSHIP COLLIERIES.

SIR,—In the *Mining Journal* of last week you give the profit of Messrs. Briggs and Co.'s Co-partnership Collieries for the year ending June 30, 1869, at 22,341*l.*, "of which 3463*l.* went into the pockets of the workmen." I should be much obliged by information as to the quantity of coal raised during the year referred to. G.

FIRING BLASTS BY ELECTRICITY.

SIR,—I have waited with no little interest for a reply to the enquiry made by your correspondent, "Fron," as to the use of electricity in firing blasts while sinking shafts, and must confess that the answer given by "C. B.," in the Supplement to last week's Journal, has disappointed me. The old slow-burning fuse, with its uncertainty and risk, appears to me to be an antiquated system, upon which modern science should be able to improve. I scarcely understand the concluding paragraph in "C. B.'s" letter, which seems to me to be as confused as the wires to which he refers. I should wish him to give a more detailed explanation of the disadvantages of the system, for the fact that six, eight, or ten charges can be fired *simultaneously* by the use of a battery must facilitate the progress of sinking, by producing a greater effect on the mass of rock to be operated upon than the firing of separate shots can do, while safety to human life appears to be an inevitable result. I should, therefore, feel obliged if "C. B." will give one or two instances in which electricity has been tried, and under what circumstances it had to be abandoned. Q. E. D.

July 19.

IRON MINING IN CORNWALL.

SIR,—Some three months since I sent you a sketch of the Pawton Red Hematite and Kidney Iron Ore Mines, near Wadebridge, and stated that a party of gentlemen occupying prominent positions in the North of England had been on the mines, and pronounced the kidney ore to be of the finest quality for the manufacture of steel. The mines were last worked by Messrs. Levick and Simpson, of the Blaina Ironworks, South Wales, and during the eight or ten years they were in their hands they shipped off something like 80,000 or 100,000 tons per annum, from a lode varying from 13 to 20 feet in width. Knowing what I do about this mine, I candidly believe that the iron is inexhaustible. According to analysis the ore will give 70 per cent. of metallic iron, and is worth from 18s. to 20s. per ton. Within the last week, I have been given to understand that these gentlemen cannot come to terms with Lady Molesworth's stewards.

They want a nominal dead-rent of 100*l.* per annum, in addition to a royalty of 6d. per ton upon all iron ore raised. These terms would no doubt be reasonable in a district possessing the advantage of an abundance of cheap coal, but in a district far separated from a coal field the amount is exorbitant. Men of business like those to whom I have referred are not to be imposed upon by such terms, and it is a great pity that stewards should have such control over property. I have repeatedly heard one of the stewards boast that they do all in their power to promote the interest and welfare of Wadebridge, but really it looks very much unlike it, in my opinion, when they want 100*l.* dead rent. It prevents capital from being brought into our neighbourhood, whilst we might no doubt have from 400*l.* to 500*l.* per month paid for wages, that being about the pay last time the mine worked. At the present time there is no mine working nearer than Old Treburgett, which is seven miles distant, whilst what is required for this mine would be had here at the foundry, and of the other merchants.

I do hope that the time is not far distant when we shall see this long-neglected district giving employment to thousands in the North of Cornwall, and I am convinced that the development of the district would well repay the capitalists who might undertake it.

Wadebridge, July 17. —— WILLIAM PAYNTER, Jun.

IRON SMELTING—THE FERRIE FURNACE.

SIR,—Your correspondent, "Smelter," from whatever cause or motive, seems ill at ease on the subject of this new process of iron smelting; his position in the present controversy obviously manifests this feeling in no ordinary degree. He tells your readers in his letter which appeared in the Supplement to the Journal of July 8 that I "vauntingly opened up the whole question of improvement in iron smelting," and complains that I regard his previous letter to you of June 10 as an "over zealous intervention." Now, what in fact is the true state of matters? If your readers are pleased to refer to the correspondence, *ab initio*, they will find it is "Smelter" who, I should say, "vauntingly" introduces so much extraneous verbiage into it. Looking at his letter of June 10, we find him heralding his approach to the subject with a "flourish of trumpets," requiring no less than 489 words to bring him up to the pitch,—perfect out-of-the-way nonsense. And if they are also pleased to refer to my letter of the 24th June, I charge "Smelter," and I think justly, that so much of your valuable space should be occupied by him with a bombastic harangue quite foreign to the subject at issue, though patronising in the highest degree. In my letter I ask him "What has this to do with the subject matter of my former letter—viz., the altitude of hot-blast furnaces, and the best and cheapest mode of making pig-iron?" His assailing me with "vauntingly opening up the whole question irrelevantly" is, therefore, simply at variance with truth.

But there is more than this, Sir, in the whole tenor of his correspondence. It portrays throughout not only a contemptible feeling of littleness—a petulant jealousy—but an utter incapacity to discuss the subject at all. He came forward, like some mighty Gulliver, to shield his buckler in defence of your Glasgow Correspondent, and would regard with a self-sustaining assurance, which no "pedantry" could approach, every other person who has ventured to express an opposite opinion to his on the subject as mere hirelings of a corruptible press, who with "fear and trembling" ought to collapse at the howl of the "overgrown boy" as they would at some Arctic bruno. His "over-zealous intervention" was, thus, as uncalled for as it was unnecessary; so also, if not to a still greater extent, was the incoherent array of verbiage he got huddled together in his attempt to crush the subject under his ponderous foot. And, withal, he has the assurance to charge me with "vauntingly opening up" an irrelevant discussion—a discussion which he grasps with the feebleness of a child," and with the petulance of one less feeble, and alike irreconcilable as inconsistent with his remonstrance against me, tells your readers, at the close of his last letter, "It is true" (speaking of me) "he did *not* refer to this subject, but that is no reason why I should not." My only object is, and has all along been, to elicit reliable information, suggestive or otherwise, from those whose experience so justly entitles them to an opinion on the subject.

It is perfect folly to accuse me of "indignation" on behalf of the "patentee." I have as little interest in, but more respect for, that gentleman personally than "Smelter" obviously manifests. I have no purpose to serve, no jealousies to dread, and I have less selfish acrimony in my nature than "Smelter" seems so saturated with. All I seek to maintain is the undoubted superiority of the innovation over every other modification of blast-furnace structures since the days of Neilson.

I never denied that increased height would give advantages; what I said was that "mere height would never yield any great advantages when raw coal was the fuel used." And I endeavoured to show, by reference to the furnaces at Gartsherrie, that had height given greater results—that is, had the three 60-ft. furnaces in blast at these works given any great advantages "over the 40-ft. furnaces," also in blast there—would this company have recently erected furnaces of less than 60-ft. had not a total absence of any advantage been found to result therefrom? The fact is notorious, for this enterprising firm at their works at Lugar erected several furnaces more recently, and of less height than the 60-ft. furnaces formerly erected at the Gartsherrie Works. But as "Smelter" tells us authoritatively that when the "one" furnace was recently erected, or rebuilt, at Gartsherrie its less height was due "rather to its position than to the question of economy," he might also have enlightened us (judging of his intimate relationship with this firm in their deliberations of expediency as to height and position *versus* economy) as to what comparative results the 60-ft. furnaces gave over those of 40 ft. in blast alongside of them. It is, perhaps, too much of me to ask "Smelter" this question, highly desiderated information though it be, for I fear a truthful answer would only negative his assumptions, and set aside the whole of his virulent harangue. I have no objection whatever to retain the Gartsherrie Company in the discussion, for the mere purposes of argument, since I have stated in my last letter that any references to them have hitherto been, and shall only be, for purposes of illustration; and if "Smelter" will honour me with his *corpus in propria personae* I shall have much pleasure in leading—for in this position he must obviously go—to the summit of a 72-ft. furnace in blast at the Almond Ironworks, not for the purpose of looking down upon Gartsherrie, but simply to show and convince him, if that be possible, what "very good reason" he has in supposing that at Gartsherrie "these *alone* in Scotland are high furnaces;" and also that his acquaintance with iron smelting might be very greatly increased were he willing to maintain less "assumption," and proceed quietly in the direction of "the tree of knowledge."

I deny *in toto* that the patentee of the Ferrie furnace has followed any "lead," successful or otherwise, because his furnace is 83 ft. in height. "Smelter" may as well argue that Neilson followed a "successful lead" when he introduced the hot instead of the cold blast, in use at that time. This inventor followed a diametrically opposite process, and although English smelters have raised their furnaces in height, and obtained admitted benefits therefrom—coke being used in the Ferrie furnace is altogether different—the greater height in this case has not been simply to raise the common chamber of the furnace as such, but by placing the self-coking retort system on the top of the ordinary Scotch furnace, of necessity, but not in imitation, the Ferrie furnace must, doubtless, assume a greater altitude; but it is so raised on a totally different principle. The English furnaces were increased in height with the object of attaining a more perfect absorption of heat from the ascending gases, whereas the increase of height in the Ferrie furnace is due to the coking retorts being placed on the top of the ordinary Scotch furnace, where the coal is coked, instead of having this done in coke ovens, 10 or 20 miles away from the furnace.

For "Smelter" to draw a conclusion that "because opportunities must have arisen in 20 years to reduce the height" of the three furnaces at Gartsherrie, if they, as I maintain, give little or no advantage, and that because they are not taken down to their former position, is really not worth answering. What gain would result from blowing out furnaces merely to take down 20 feet of brickwork? None whatever. If the Gartsherrie Company had found the higher furnaces to give better results than those of less height the proper argument would have been—Why not so raise others?

It is not true that I retreat from the position "that the four columns of the Ferrie furnace removed the greater pressure in a one-chamber high furnace." What I formerly stated was that by the walls in the retort arrangement of this furnace "double the amount of friction is obtained in the four descending columns, and that also by the more regular arrangement of the sinking materials it permits the blast passing upwards to permeate more easily through the mass than if it were in a large single chamber." In this opinion I am glad to see I am borne out by Mr. Bessemer, the President of the Iron and Steel Institute, for in his remarks on this furnace he says "The friction on passing down the four large compartments would, no doubt, so far separate the burden as to get over that difficulty;" and Mr. Plum, also another competent authority, says "the chambers will prevent so heavy a weight being thrown upon the coke," and so it is, I believe, the fact, confirmed by a lengthened trial in the working of this furnace.

With regard to the relative value of coal and coke for blast furnace purposes, I have yet to learn that "coking in any blast furnace is in its condition the same as in a retort," and that ordinary Scotch coal will "give quite 65 per cent. of coke." Coal transformed to coke in an ordinary open-topped furnace will not even give the percentage of coke which the coal contains, whatever that percentage may be, for the action of the flame necessarily acts more destructively on the coal than when it is coked in retorts, hence doubtless one of the causes of the saving in coal at Calderbank; for the retort arrangement of the Ferrie furnace not only self cokes the coal in its descent to the tuyeres, but at the level of the ordinary Scotch furnaces the coke and ores have also the additional advantage of being supplied at a high red heat. I deny absolutely that ordinary Scotch coal will give 65 per cent. of coke. Professors Playfair and Richardson found on analysis of eight samples of the best Scotch coal, selected for Admiralty purposes, that 54·22 of coke was the percentage, as compared with 72·62 in Welsh, and 60·67 in Newcastle coal; and I am satisfied Mr. Hunter, who "Smelter" says quotes Scotch coal as giving 65 per cent., will at once concede it is erroneous; indeed, I question very much if our ordinary coal will give more than 50 per cent. of coke, so that, according to Cocker, 35 cwts. of coal is only equivalent to 18 cwts. of coke. I decline to accept the statement on the authority of "Smelter" that "Newcastle coals cannot be used raw," or that English ironmasters smelt every day with 18 cwts. of coke and produce as good iron as we do, I deny.

Mr. I. Lowthian Bell distinctly points out, when speaking of "a long series of experiments" conducted by this gentleman and Mr. Williams, at Eston, that, though the latter furnaces "have a height of 95 feet (15 feet more than those at Clarence), supplied with material precisely of the same character, and worked precisely in the same way, they consume no less coke per ton of iron than do the Clarence furnaces. At Eston (see page 320 of No. 2 Iron and Steel Institute Transactions), says Mr. Bell, the furnaces "make pig-iron with a consumption of coke almost the same as that at Consett," and "both smelting the same mixture of hematite and Cleveland ore," producing an "average quality of iron, No. 4·49; and (at page 336) comparing the Clarence and the Eston furnaces, he tells us "they consume no less coke per ton of iron than do the Cleveland furnaces." And (at page 353) Mr. Williams avers that "beyond 11,000 or 12,000 cubic feet capacity there is no saving of coke per ton of iron," the Ferry Hill furnace, be it remembred, being of 33,000 cubic feet compacity. What then, *de facto*, is the quantity of coke these makers use per ton of No. 1 iron? At page 447 Mr. Bell says "22 cwts. of coke is precisely which is now being used in the Cleveland district." We see, therefore, at Clarence, Consett, and Eston the coke used is the same—22 cwts.; and, if Mr. Williams is to be credited, the Ferry Hill furnace must also require this quantity of coke, the iron, too, in the cases cited being of inferior quality to that made at Monkland, which I understand is all No. 1, whereas in the table quoted, at page 320, I I find the "average quality of iron is No. 4, 49." No doubt "less coke is required to make 1 ton of pig from rich than poor ores," just precisely what we find in the table given by the Coltness Company, of a trial they undertook with the Ferrie furnace (page 346) equal in the one to 52·93 cwts. of coal, as compared with 34 cwts. in the other, in consequence of the mixtures used. If "Smelter" will look

at the tables (pages 435 and 436) obtained at the trial of the Ferrie furnace, undertaken by the Coltness Company, he will find the quantities used are 34 cwts. of coal, and 38·29 cwts. of ores; whereas with the Calderbank materials the quantities are 35·44 of coal and 35·60 of ores per ton of pig. In the tables cited we also see a saving effected in the covered furnace of 2½ cwts. of ore, as compared with the open-topped furnaces placed against it, so that if "Smelter" had any practical knowledge of the trade at all, he ought to have known, from the mixtures used at Calderbank, that such results must necessarily have followed.

A No. 1 IRONMASTER.

HYDRAULIC OR WATER MINING VERSUS QUARTZ MINING IN AMERICA.

SIR,—In the Supplement to the Journal of May 20 appears an article under the above heading, which, to say the least of it, is open to grave comment, if not to severe criticism. A thoughtful perusal of that communication leads involuntarily to the exclamation—Save me from my friends. The garb of candour there so lavishly displayed is wholly insufficient to conceal the design the exposure of which must be fatal to its object.

Ostensibly the writer essays to give—what I shall at once concede—deserved prominence to quartz mining, which means "mining" according to the modern English acceptation of the term, as contra-distinguished from tin streaming, which is analogous to gold washing. Hydraulic mining in America—the only difference being in the application of the water as a mechanically operative power for which England affords no parallel. It needs no argument or illustration to show the superior importance of mining proper to hydraulic mining, here or elsewhere, the relative merits of which may be accurately inferred from the difference in value, in a commercial and industrial sense, of the mining of Cornwall and its tin streaming. So far, I think, the writer's position is consonant with the truth; and further, when he states that he is more than anxious that quartz mines should be placed on the London market, it cannot but be inferred that he is at least interested. The article under consideration evinces the utmost ignorance of practical mining, as the merest tyro on reading it could not fail to discover. Take the following in evidence whereof:—"The history of mining shows that much time and capital have been lost in hunting for the true vein of the precious metal; but when once found it is rarely lost." What vein, it might be asked, and of what metal; in what country or locality, time, or place; when and where lost or found? as the case may be. Such a paragraph is too transparent to require comment. Such a condition of things may have some foundation in fact, but never except in a limited and special sense, and should be so qualified. In its application to mining, so far as yet prosecuted on this coast, it can only refer to the difficulty of connection between the surface workings for alluvial gold and the quartz reefs or lodes from whence it was disintegrated. The design of such a passage was evidently to convey the idea that all risk is confined to the mining prospector, whilst prosecuting his search for lodes supposed to exist in any locality to which he may devote his attention; and that if successful in the object of his pursuit, all liability to further outlay immediately terminates. It is almost unnecessary to say here that the history of mining which may be found to endorse such an assumption must be as limited in its application as it is recent in its origin, even as applied to gold mining in California.

Turning to silver mining in Nevada, what is there the condition of things, but that the most systematic veins are the most systematically "faulted," equally so in a great number of instances to the coal measures of England and Wales; besides their liability to horizontal displacements, which are as frequent here as at any other place in the general order of that phenomenon.

The comparative ignorance of the English investing public of the metalliferous resources of the interior of the North American Continent is not much to be wondered at, since the Americans themselves have only recently become seriously acquiescent in the fact, and as yet fail to realise even approximately its value.

The lamentation of "A Southern," that "we cannot erase history," is truly characteristic, and shows that a favourite method of appearing greater is by diminishing or removing unfavourable contrasts. If comparisons are sometimes odious, contrasts may be found irrelevant, and merit no legitimate application; which will be found to be true of mining in the United States as compared with that of Mexico or South America: the latter are systematic developments, whilst the former is yet at best but an unsystematic attempt at development. I do not think the facts of history, statistical or otherwise, need to be obliterated or concealed to give due prominence to mining in the United States, when it shall be sufficiently advanced in systematical development. There is danger, however, that all may not be realised which is anticipated. It should never be lost sight of in an estimation of the value of mining properties in this part of the country that many of the rocks are of volcanic origin, and very many more are disrupted by that agency; it is, therefore, highly probable that many superficial deposits will be found, and many more separated—broken—from their counterparts. It not unfrequently happens that deposits of this class yield comparatively large quantities of more than average ores, but there is no analogy between such a class of veins and that denominated "true fissure," which constitutes the most approved permanent mines.

The laws by which metalliferous deposits are regulated in Devon and Cornwall, both as regards their merely superficial occurrence and continuity in depth, are equally applicable here. And similar suspicions are valid and precautions necessary in respect of what may be termed the sensational class of deposits—that is, the superficial. It is well known that precocity of fecundity, to use a figurative expression in respect of metallic minerals, is always regarded with merited suspicion in all countries whose experince in mining has been of any appreciable duration—that is to say, sufficiently extensive to deduce general rules by analogical reasoning. It may be difficult to draw a sufficiently intelligible line between the merely superficial deposit and the natural legitimately produced outcrop of a permanent and continuously productive lode in depth, yet to the practised and experienced miner each are accompanied by distinctive traits, clearly indicative of what they portend, and which, if duly observed, will suffice to preserve him from fatal or egregious blunders. One scarcely knows how to deal with all the anomalies occurring in the remarkable communications of "A Southern." The following is submitted as another example:—If American gold and silver mining be confined to dividend-paying properties, they may with all possible safety rely upon millions of capital being taken up in Europe. If in the swaddling-band infancy of mining on this great and prolific continent capital is to be nowhere employed but in the purchase of what are called dividend-paying properties, it is easy to predict what the sequel will be—the sunny climax of prosperity anticipated by "A Southern" at the expiration of another decade will never be realised. As well might an increase of the population of this or any other country be counted upon as the natural consequence of extinguishing the "vital spark" of all the infants of both sexes which may be born during that period. There is no greater improbability in the one case than in the other.

I am in a position to state for the information of "A Southern," as well as all others whom it may concern, that some of the most meritorious and extensive mining properties in this part of the country are prosecuted to the very threshold of success, and are there stuck for the lack of a few thousand dollars to develope their vast resources, and yield to the owners the profits they are so unquestionably destined to give. To dignify claims, where only scratching or digging has been done, with the captivating title of "dividend-paying mines" is an abuse of the language, privilege, and freedom of civilisation. If no systematic arrangements have been made for the prosecution of developments in depth, such as a working shaft, &c., no matter what profits may have been made, the term dividend-paying mines, according to the modern general acceptation of the terms, is a misnomer, and confounds all the proprieties of language.

If bunkum ever fizzled in a senseless peroration we have it in the following—Nothing seems to stop the child of the West. She is bounded on the north by ice and snow, and not, of course, by the dominion of Canada; and on the south by sunny tropics, and not by Mexico and the Gulf of Mexico, which bounds the United States everywhere on the south in sub-tropical latitudes. I know of but a step farther that practical exaggeration could have gone, and that was to say, as some one had previously said, that the United States were bounded on the north by the Aurora Borealis, and on the south by the Zodiac, or plane of the ecliptic.

The English capitalist cannot do better than allow himself to be guided by the experience acquired by mining in his own country. The differences which are found to prevail between it and mining in other countries are differences less of kind than degree, and are easily understood by a practically observant man. And although it may sometimes happen that properties failing to receive the approbation of English inspecting agents may, subsequently, be wrought into a display of profits, too much importance, however, should not be attached to the circumstance, and hasty conclusions drawn that they were radically wrong, and mistaken in their judgment.

Errors through excess of caution are far less damaging to mining, and consequently to the investor, than those reckless errors of ignorance and unscrupulousness perpetrated in the opposite direction. It would be difficult for Englishmen to conceive, or conceiving to accept, the methods which are sometimes employed to promote appearances, especially when important pecuniary objects are in view. A mine without a bottom, or that has not a bottom a good way down, is never much appreciated by the English investor; the constant apprehension of its collapse, and finally such a crisis overtaking it, is anything but reassuring to the enterprise, or flattering to those embarked in it.

I may be permitted to add, before I conclude, that theory and pretence are terms synonymous in this part of the country, and as either is esteemed of paramount importance to experience in mining, they are stereotyped with the superscription of popular endorsement, and obtain easy and inevitable currency. To be without a theory is to be without the necessary qualification for mining; but as the article is restricted to no particular model, and is of easy manufacture, every man becomes his own artist in this respect, and supplies himself according to his individual taste or judgment, or the absence of both or either, as the case may be. The consequence is that there are as many theories afloat as there are individuals to represent them, and that, too, without any foundation or uniformity more substantial than the baseless fabric of a vision. Pretenders of this class do not ask what is your experience, but what is your theory. They seem never to have been sufficiently exercised in the affairs of practical life to realise that theory becomes absorbed by advanced experience, just as the stars by being bathed in the sunlight lose their lustre.

Nevada, June 21.

PRINCIPIIS OBSTA.

THE PACIFIC SILVER MINES.

SIR,—There is no doubt but the silver mines on the Pacific coast fully deserve the attention that British mining investors are bestowing on the numerous projects that are soliciting their support. It would be strange if amongst the number some should not on trial fail to come up to the mark; in other industries than mining, especially when capital is diverted into a new and rapidly growing channel, blanks will be drawn, and that not necessarily arising from any settled purpose to deceive, but from causes that are more to be ascribed to an over-sanguine temperament, and, perhaps, lack of proper business organisation.

We think that the strictures of the *Times* has led to a different result than the writer of it anticipated, and those interested in enlisting the aid of our capitalists feared. This unexpected and gratifying result has arisen not so much from the rebound to the opposite belief that invariably follows over-drawn statements and unwarranted general conclusions, or even, although that was salutory and forcible in its way, to the reply of the United States Mining Commissioner, as to the spirit of caution that has since markedly characterised the proceedings of those promoting American mines. The great distance of the mines from London, and the universally believed idea that Yankees are, to use their own designation, "considerable smart," possibly underlie the whole tenor of the remarks that the Thunderer thought suited to the emergency, and the quick apprehensiveness of our mining pioneers at once assented to the necessity of prudence, with the laudable object of inspiring that confidence (which being all that was required, the productiveness of the district being unquestionable), has eventuated in the large, increasing, and eager subscription to those undertakings that have fulfilled the demanded conditions of security brought out by competent and honest previous enquiry. The ready response to the call for means to possess and work mines whose *bona fides* are attested by reliable mining authority, is well exemplified in the case of the Mineral Hill Silver Mining Company, which asking for 300,000*l.* actually had application for over four times that large sum, at once a tribute to the standing and ability of Messrs. Taylor, and a proof of the public faith in the resources of the mines on the Pacific coast.

As we have selected the Mineral Hill Mine, on account of its being far ahead of others in the amount of called-up capital, to illustrate the believed capabilities of these mines to pay suitable mining interest on the large sum invested, so we would instance the Ajax Silver Mining Company, by reason of it being, as regards capital, the lowest in the list of new mines, to show, as a good sign of the times, the extreme solicitude manifested by the direction to secure shareholders' interests in all the details of selection and after working. It may be a matter of feeling, but we confess to a decided liking to those concerns that, like this one, are more intent on devoting the capital to work the mine than to fructify the vender's pocket. The brief but workman-like *resume* of organisation, working, and selection of the mine (along with primary necessity of value), with an eye to economical exploitation, labour, dressing, and carriage facilities (no mean advantage to a mine in a newly settled country), evinces the anxiety and intelligent appreciation, on the part of the promoters, of what is requisite to further legitimate mining, and is sure to command, as it deserves, the most unqualified success.

The completion of the Pacific Railway, and the facilities thereby presented for rapidly communicating with and working the Pacific mines, has no doubt powerfully, we had almost said wholly, created that growing interest amongst British investors which we have noted. The magnitude of the undertaking accords well with the enterprise of our Transatlantic cousins; and the same sagacity which, alive to the latent resources of these States, devised and successfully finished the railway that links the Atlantic to the Pacific Ocean will not fail, with that rapidity for which they are unexampled, to lay down a network of feeders radiating from the Grand Trunk line, and so render available the mineral and agricultural resources of these immense, but hitherto inaccessible, regions. True to the universal procedure that has prevailed from immemorial antiquity, and is more strikingly manifested now than ever, the miner is first in the field in the search for and development of Nature's treasures, the precursors of a teeming population, which will, a few years hence, find a comfortable home in Colorado, Nevada, and adjacent territories.

July 19.

W. G.

AMERICAN MINING "EXPERTS"—THE VALUE OF THEIR OPINION.

SIR,—Personal observation during a somewhat lengthened sojourn in the mining territories of the Pacific Coast has confirmed a previously formed opinion—that American mining "experts" are much more "crabbed, cabined, and confined" in their judgment upon mines out of their own district than are the "experts" of Cornwall, or even Wales. They are not only far more susceptible to local influences and prejudices, but allow their expressed opinion to be strangely warped and contorted. A recent case has just come under my notice, in which a young man, whose experience (such as it is) has been gained among the gold quartz mines of California, was solicited to inspect and report upon a mine in another territory—a mine, I should add, producing a totally different mineral, and, therefore, one in relation to which this young man had had no experience whatever, even theoretical. Notwithstanding the actual results that were being obtained, and the unequivocally favourable opinion of at least one who has had a life-long experience in similar mines, this California "expert" expressed an unfavourable opinion.

This, however, is not such a striking case as others that have come under my personal observation, because I have since ascertained that this "expert" is attached to a body whose aim is to prevent, if possible, any mine being purchased except through its agency—hence, no doubt, the opinion. The Eberhardt and Aurora, however, is a very striking instance, because it was talked of throughout California, and by *all* its "experts," as anything but a legitimate enterprise, and simply because it was in another territory; notwithstanding, it has proved a marked success.

It is clear to my mind that no more importance should in any case be attached to the opinion of an "expert"—even though it be altogether unbiassed by local or other prejudices—beyond the actual value of the ore ground really discovered; in other words, that American, like Cornish miners, however great their experience, are almost invariably grievously at sea in expressing opinions upon mines situate out of their own favourite locality.

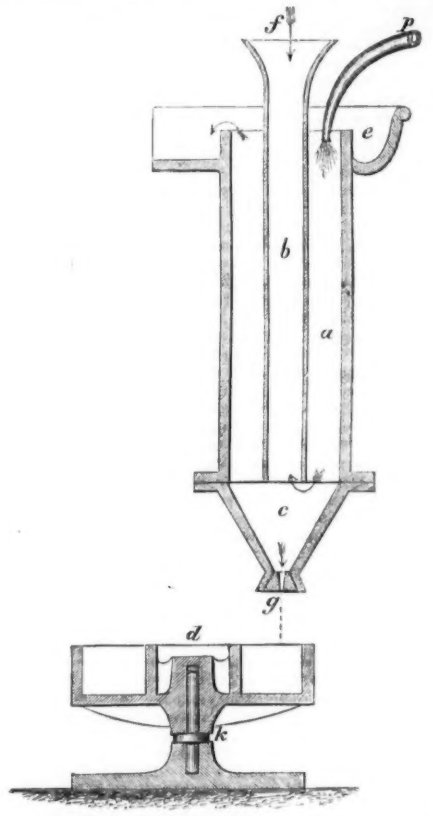
MINING TOURIST.

Langham Hotel, July 20.

ORE DRESSING—No. XI.

SIR,—Ore concentrators which have a continuous motion may be divided into two classes, the first of which is based on the principle of the different velocities with which grains of different densities will fall through a column of water either in motion or at rest, and are adapted to more or less coarse-grained ores; while the second class, being based on the amount of frictional resistance offered by grains of different gravities flowing over even surfaces, either horizontal or inclined, are more adapted for very fine sand and slimes. There are an infinite variety of machines belonging to these two classes. I propose to mention only one or two examples of each kind. It is evident at first sight that all these machines, being entirely dependent on the difference of the specific gravities of the different ores to be separated for successful working, it becomes absolutely necessary that the classification of the grains as to sizes should be as perfect as possible; the least variation in the size of the grains would prevent any separation taking place. It is also of the greatest necessity that the motion of the machine should be perfectly uniform. These two points form generally the greatest drawbacks to the successful working of these machines as compared with the intermittent acting machines, where the error committed on one stroke of the piston or cam may be rectified by the next. The continuous machines require also that the feed of ore should be perfectly regular and uniform. As types of the first class of continuous concentrators we may take Hundt's concentrator, and that one patented by Huet and Geyler. The former of these machines consists of an upright cylinder or tub, about 7 ft. high, and 5 ft. diameter. In this tub revolves an upright cylinder, of about 4 ft. 6 in. diameter. This cylinder is partially closed by a truncated cone, which is fixed to a central vertical shaft, on which it and the open cylinder revolve. The space between the cylinder and the cone is about 2 in. at the bottom, and 6 in. at the top. They are fixed together by flanges from distance to distance, and revolve concentrically. The stuff to be concentrated is introduced at the top, and on entering the water is, of course, subjected to two forces, the one being the direct fall caused by gravity, and the other being a lateral force caused by the revolving current of water—the result of these two motions being that the grains take a diagonal course, and are deposited round the circumference of the tub, according to the rates of speed with which they fell. They are removed from the tub as fast as they settle through conduits arranged for that purpose. This apparatus works well with very coarse-grained sands, even up to ¾ in. diameter, but becomes defective when fine sands are treated.

Huet and Geyler's Ore Separator, as exhibited in the Paris Exposition of 1867, consisted of two stationary and concentrical cylinders,



a and *b*, which are kept full of water by the pipe, *p*. At the bottom of the outside cylinder is fixed a conical piece, *c*, in which is a small opening, *g*, where a portion of the water escapes, the surplus overflowing at the top into the trough, *e*. The second part of this apparatus consists of a circular vat or receiver, placed immediately under the opening, *g*. This receiver is made to rotate on a central pivot, *k*, and is divided into four compartments. The manner of operation is as follows:—The stuff is fed in at regular intervals (longer or shorter, according to the kinds of ore to be separated) at the top of the cylinder, *b*, and separates according to its specific gravities as it falls through the column of water into the receiver, *d*. This receiver being made to revolve at a given speed, the separated particles, of course, fall into different compartments, and are then removed at intervals. The height of the column in these machines is generally 1·00 millimetre, though, where fall enough can be had, 1·50 millimetre is preferable. The following tabular statement, taken from Mr. R. W. Raymond's recent report of Mines and Mining West of the Rocky Mountains, as to the different velocities in seconds with which grains of different sizes fall through a column of water is very interesting in connection with this machine.

The column of water is considered as 1·00 millimetre high.

Size of the gravel in millimetres.	Galena. Gravity, 7·56.	Pyrites. Gravity, 4·60 to 5·00	Barytes. Gravity, 4·50.	Blende. Gravity, 4·15.	Quartz. Gravity, 2·70.	Carb. lime Gravity, 2·60.
30·00 to 18·00	0·90	—	—	—	2·36	—
18·00 7·00	1·11	—	—	—	3·67	—
7·00 5·50	1·50	—	—	—	4·61	—
5·50 4·44	1·84	—	—	—	6·10	—
4·44 4·17	2·03	2·54	2·81	2·88	7·27	3·86
3·94 3·67	2·48	3·43	3·73	4·61	7·61	5·56
2·77 2·50	3·11	4·41	5·55	6·53	—	6·83
1·77 1·50	4·14	6·21	8·30	9·78	—	10·17
1·00	5·27	10·36	11·33	11·67	14·64	17·21

According to this table, therefore, it would be necessary that the circular receiver should revolve at the rate of 17 revolutions per minute for grains of 0·018, and slower in proportion as the size of the ore increases.

Besides these machines there are also a great variety of conical or pyramidal separators, but these have been lately so well described

by Mr. George Darlington in these columns that it would be useless for me to take up your space further with them.

New York, July 6. E. G. SPILSBURY.

MINING IN IRELAND.

SIR,—I was glad to see in the Supplement to the Journal of July 8 a notice of Mr. Spargo's "Guide to Investors" in reference to the Mineral Resources of Scotland and Ireland. Of the mines and quarries of this country I can speak from long experience, having examined most of its mineral districts from Cape Clear to the county of Donegal, and I am confident that a better field for the *bona fide* investment of capital in mines and quarries than the south-west of Ireland does not exist. It seems, therefore, very strange that English capitalists will ransack the remotest corners of the globe in search of objects in which to invest millions of money, and pass by safe and secure speculations at home, as any part of this country may be reached in a few hours from London, and the capitalist may always have the satisfaction of seeing and examining for himself in what manner his money is expended.

If Mr. Spargo will visit this country I will show him argentiferous ores yielding from 6 ozs. to 300 ozs. of silver to the ton, and auriferous ores yielding from 10 dwts. to 2 ozs. of gold to the ton; also copper ore yielding from 10 to 50 per cent. of pure copper. I know extensive mineral districts (virgin ground) in which carbonate of copper may be dug up at the surface. I know also a mine or two which are furnished with ample machinery and complete surface plant, and about, if I may use the term, half developed. A little more capital would now in a short time, beyond any doubt, permanently place those mines in the Dividend List. I know where flags or slabs of the best description, which require no dressing except straightening the edges, may be quarried of any size, and shipped in vessels of any tonnage direct from the quarry. It is an old saying that "seeing is believing." I would, therefore, say to the capitalist come and see for yourself.—*July* 13. HIBERNICUS.

THE WELSH SLATE TRADE.

SIR,—It is with considerable interest and pleasure that a great many readers of your valuable Journal will hear of the great stir and general activity again prevailing in this great national commodity. During the late continental war large quantities of slate had accumulated at the various shipping ports of Wales. Stocks thus accumulated, however, are now being, in places, rapidly reduced; this is specially the case at the port of Carnarvon, the favourite resort of the great slate merchants of England, as well as most of the continental agents, which has now become the greatest slate depôt in Wales; and, owing to the various young quarries situated within from five to eight miles of this place which are gradually but surely unfolding their value, and bringing themselves into notice, one does not wonder at the following remarks from Mr. Moon, Chairman of the London and North-Western Railway, made on the occasion of opening the Llanberis Railway for passenger traffic. Mr. Moon said—"The London and North-Western Railway had woven a girdle which now completed the circle round Wales. Their object had been to bring coal into North Wales and take back slates, and they had told their traffic managers that in three years the traffic must be quintupled; and if this were realised it would inaugurate a new era, and largely increase the wealth and prosperity of the town of Carnarvon." This is certainly anticipating a great deal in a short period; nevertheless, it certainly will soon be realised.

The slates obtained from the Bangor and Llanberis range of slate rock veins are acknowledged to be superior to any other slate known for general purposes. They also produce all the favourite colours of slate—grey, blue, red, purple, and green, all of which vary somewhat in colour, according to locality of quarry; in fact, I scarcely know two quarries in this range producing slates such resemblance to each other as not to be recognised as coming from a particular quarry. Most favourite colours are the green and the celebrated Bangor greys; but the most abundant are the purple and blue. Slate merchants would be furnished with all the above-named colours by taking a stroll through the slate quay at Carnarvon; hence the great advantage offered to slate merchants at this place to many others in Wales, when only the dark blue, known as the Festiniog slates, are visible in quantities.

A great discovery of slate, the famous Bangor greys, has been recently made by some Anglesea gentlemen at a place called Plas-y-Nant, near the celebrated Naut mill and waterfalls, about five to six miles from the town of Carnarvon, alonside the main road leading to Beddgelert. The land belongs to the Baron Hill Estate, and has been under lease for a great many years; but it appears the late proprietors worked on a blue but separate vein of slate in the eastern part of the property. It appears, however, the well-known quarry proprietor Mr. Brewer had hit on this great vein some time before his death. Little or nothing, however, was done until recently, when Mr. Edmund Spargo, and one or two of his Anglesea friends, made a fair start. The results of their trials appear to have astonished all who have seen the property recently. The samples of slates obtained within a few yards to the surface are truly marvellous for the depth. Slates of all the usual marketable sizes have been obtained within a few yards to the surface. The property has been inspected by most of the leading authorities in Wales, all of whom have been most favourably impressed, including Mr. John Frances, Brynderwn, Bangor, Captain John Paull, of the famous Llangollen Slab and Slate Works, belonging to Messrs. John Taylor and Sons, Mr. William Williams, who for upwards of 30 years was manager of the celebrated Welsh Slate Company's Lord Palmerston quarry, now consulting manager, Mr. Joseph Kellow, the well-known quarry engineer, of Portmadoc, and others of practical experience. The vein is estimated to be at least 300 yards wide. The working facilities, in all respects, are said to be most advantageous, which includes water-power to any extent.

Mr. Spargo has the good wishes of all who know him, and, indeed, many of the labouring classes are indebted to him for their present daily food. There are upwards of 30 men employed at the Aetianies Slate Quarries, which was recently sold by him to a Yorkshire company. Indeed, he has been the means of opening the eyes of many people to various valuable minerals. He has, during the last few weeks, brought into notice Rhos Colyn Serpentine (Vent Antique) Marble Quarry, now being extensively opened out by Messrs. Haywood and Lee, civil engineers, Bangor, to whom he has just disposed of his interest. G. J. H.

THE MINING MARKET.

SIR,—Will you permit me to call public attention to the fact that the Mining Market is now located in the street. The Mining Exchange room, for some reason or other, has been given up, and at a time when mining is becoming more than ever one of the institutions of the country. Those who should uphold its respectability are, as it appears to me, assisting in degrading it. Surely this motley group, consisting of Stock Exchange, Mining Exchange, and outside men, now congregating in the streets around the Stock Exchange, might find some room or institution where they could transact their business, without the comments of the passers by. Let me suggest that the leading men at once meet and arrange to take some room as a place of meeting, a general resort for Stock Exchange and mining men. OMEGA.

THE WEST CHIVERTON MINING COMPANY.

SIR,—With reference to a letter as above headed in the Supplement to last week's Journal, I would observe to the writer that I am neither a "bull" nor "bear," nor influenced in these remarks by any motive for a rise or fall in shares. I am simply a rather poor individual, who a good while ago, looking around him for an investment both safe and lucrative for his declining years, was strongly advised to put his little savings into the above mining company. For some years I have reaped to my fullest expectations, and also with the regularity of Consols. I came to regard the management with feelings of the profoundest esteem and gratitude, and found myself not seldom blessing the good fortune that had led me to make the happy selection. And now "a change has come over the spirit of my dream," yet will it require something more than the omission to charge up a month's costs in the quarterly statement, through an exceptionally hard and unfavourable winter, to shake my long-cherished confidence in the ability and integrity of the committee. Having good reasons myself, doubtless in common with many others of the hundreds constituting the company, to think half a loaf better than no bread, I believe the committee exercised a very wise discretion in declaring the 1l. per share, instead of the nothing that "Shareholder" would have advised; indeed, I cannot be persuaded that "Shareholder" has really the interests of the mine and company at heart. I have little question but the committee (especially with a rapidly again improving property) felt that the deficiency, if not made up by next meeting, would be assuredly so by that following—meantime, the shareholders were being maintained in heart and pocket by a dividend as usual, though of less amount. In conclusion, I deem the present direction deserving of our best thanks and support in the way they have acted, nor do I hesitate recording my complete faith not only in themselves, but likewise the mine, as being a rich and dividend-paying property for long to come. A DISTANT SHAREHOLDER.

MINING IN CARDIGANSHIRE.

SIR,—While I admire the conduct of your correspondents in upholding their country and countrymen, I cannot but think that Mr. Trevethan, M. and C.E., is justified in his remarks. Of course, he referred to inspection of mines in Wales, and not Cornish miners in Cornwall. If experience goes for anything, and this is what I understand Mr. Trevethan to mean in his Notes, who is the most competent person to inspect mines in Wales?—One who has had from 15 to 20 years' experience in the Principality, and in some measure operated upon all the different strata and lodes, making them his daily study for that long period? or one paying it a casual visit from either of the two western counties for a day and away? The answer is evident: therefore I say to intended speculators, encourage experience.

Referring to Cornishmen, they have undoubtedly the pre-eminence of all other countries as practical miners; but taking them as found in the mining districts of Wales, their common sense, or practical skill, cannot be considered superior to a fair average of Welsh miners. As a rule, the best and most experienced of Cornish miners remain in their own county, or emigrate, or are engaged by foreign companies to go abroad; while out of the few that come to Wales the majority of them are young and inexperienced, and not unfrequently, when about to exchange one place for another, they leave a something behind as a reminiscence. Mr. Trevethan's Notes convey a great deal of information, but I think he might be a little more elaborate and disinterested. CYMRO.

MINING IN CARDIGANSHIRE.

SIR,—It appears that the "Manager of West Bronfloyd" presumes to take Mr. S. Trevethan to task for his comments, and makes some remarks on the supreme knowledge of Coralsh agents. We allow them all the credit due to them without any restriction whatever, but are certain they are not as capable of judging Welsh mines as those men who have resided in the Principality 20 or 30 years; and after the "Manager of West Bronfloyd" has been here that time, his knowledge will increase no doubt. We do not yet, however, hear of any great improvements taking place under his "management" at Penygroes, in North Wales; but we hope soon to see his name attached to the first sampling at that mine. CYMRO (2).

[For remainder of Original Correspondence see to-day's Journal.]

THE MANUFACTURING INDUSTRY OF GLASGOW.

THE LILYBANK BOILER WORKS.

The specialty of trade which is cultivated by Mr. Wilson is the construction of land boilers, and in it he has acquired a somewhat eminent position. Boiler making, as a rule, is carried on in most large engineering works as part and parcel of the legitimate business, but there are hundreds and thousands of manufacturing and other firms who require the appliances for generating steam-power, while they do not necessarily repaire to renew their steam-engines; and a person who devotes himself specially to the manufacture of such appliances is almost certain to "make his mark," providing, of course, that he also possesses a fair amount of technical skill and commercial energy. Mr. Wilson has certainly succeeded in his mission, if we admit as the sign of success the fact that his boilers are found at hundreds of places at home and in almost all civilised countries abroad. For instance, at the time of our visit to his works we found in hands part of an order for six boilers, 25 ft. long by 7 ft. in diameter, which he received from a cotton printing establishment in the State of Massachusetts. Lilybank boilers are sent to many places in England and over all Scotland. Even what might be regarded as the "preserves" of the Cleveland or other North of England firms are "poached upon," in a sense, by Mr. Wilson, as he not long ago made and supplied to order no fewer than eight double-flue boilers for the West Hartlepool Ironworks of Messrs. Richardson and Son. Amongst the various cotton-printing and other works in the village of Barrhead and its belongings, some 45 or 50 of Wilson's boilers may be found in use; and the same rule holds good generally with reference to Glasgow and its immediate vicinity.

Considering the fact that a special committee of the House of Parliament has sat during both of the last two sessions of Parliament to enquire into the subject of steam-boiler explosions, and bearing in mind the fact, likewise, that about fifty such explosions occur annually in the United Kingdom, causing the death of about 75 persons, the manufacture, erection, and use of steam-boilers are of the utmost importance to the community at large. It is a most desirable thing to have the opinions and professional experience of a gentleman who has spent a large portion of a lifetime in the boiler-making trade upon such questions. This is not the place to give the results of Mr. Wilson's experience upon them, but we may at least mention that his notions as to the boiler "of the future" are that, being of a cylindrical form, its length and diameter should be in something like the proportion of 3½ or 4 to 1; that the plates of the flues should be of Bessemer steel, with Bowling rings at the circular seams; and that the boiler itself should be provided with Galloway's tubes, by means of which the flues are strengthened, fuel economised, the quantity of steam increased, and the circulation of the water improved.

Mr. Wilson formerly made a number of marine boilers, but he now devotes his attention wholly to land boilers, of which he turns out about 200 per annum, taking large and small together. The largest which he has yet made was 35 ft. long by 8 ft. in diameter. The number of hands employed at Lilybank Boiler Works is about 60, but it must be remembered that land boilers are of a much less complicated structure than marine boilers, and that in consequence fewer hands are employed upon them. Since the works were first commenced they have several times been extended, and we understand that as there is a prospect of the Eglinton toll-house being removed further south on the Pollokshaws Road, next year, another extension of the works may be looked for.

ETNA FOUNDRY, LILYBANK ROAD.

Messrs. Watson, Gow, and Co.'s foundry is situated on the south side of Lilybank-road, a short distance from Eglinton-street. The buildings occupy an area of about five acres, in addition to which there is ground not yet actually built upon which extends to about three acres more. Etna Foundry dates back well nigh 30 years, but it has only occupied the present site since the year 1855. In the hands of its present proprietors, the foundry has very greatly increased in extent and importance. It is almost exclusively in the department of domestic castings that Messrs. Watson, Gow, and Co. are engaged, so that in one sense the Etna Foundry might almost be regarded as outside our domain. The Etna castings are not such as engineers require, unless in a limited degree; they are rather such as the architect requires, both for utility and for ornamentation, while many of them are in constant use for domestic and general sanitary purposes. Amongst the goods made by Messrs. Watson, Gow, and Co. we may indicate a very general but limited selection, such as Anglo-American kitcheners, close and open fire ranges, steam cooking apparatus of every description, American cooking and heating stoves, American portable farm boilers, ships' galley ranges, cambooses, register grates, ornamental iron mantel-pieces, mantel registers, hot-air stoves, rain-water pipes, gutters and their connections, gas and water pipes, hot-water pipes and connections, ridging and cresting, gill air-warmers, stable fittings, soap pots, sugar pans, sugar coolers, and other plantation castings; Dutch ovens, boilers, pots, and pans; camp ovens, negro pots, rice bowls, hollow ware, axle bushes, lamp posts, columns, balusters, balcony panels, metal pumps, stack pillars, metal sashes, skylights, plain and ornamental brackets, garden chairs, garden rollers, scrapers, tomb and staircase railings, sink traps, plough metal, bullion sales, water tanks, baths, water closets, &c. Indeed, the Etna castings are almost endless in variety.

Including designers, modellers, founders, dressers, fitters, polishers, finishers warehousemen, &c., Messrs. Watson, Gow, and Co. gives employment at present to about 450 persons, and during winter that number is generally much exceeded. Much of the work is done by piece, and in most instances skilled workmen make good wages. The warehouses are very extensive, and of necessity the several floors are of great strength. Each floor is reached by means of a steam hoist. The stock of certain kinds of goods is so great that very large orders can be executed at a moment's notice. What excited our attention most in passing through the foundry was the extent to which the ornamental cast-iron mantel pieces are getting into use in lieu of wood and marble. Some of them are highly artistic productions.

LANCEFIELD FORGE, SCOTLAND STREET.

Like the Victoria-street Foundry, the Lancefield Forge is almost entirely created by the marine engineering trade. It was commenced in the year 1856, by the late Mr. Alexander Fulton, and, after standing idle for nearly two years, it was taken possession of in 1861 by the Lancefield Forge Company, the partners of which are among the most eminent citizens of Glasgow. Since it was acquired by its present owners it has been trebled in size, and many of the arrangements have given place to others of a greatly improved character. The waste heat from the various furnaces is invariably used in getting up steam. A number of puddling and heating furnaces are included in the works, and by this arrangement the company are able to make all their own puddled bar-iron. Altogether there are twelve steam-hammers, from 15 cwts. to 7½ tons, including all the most approved forms—Rigby's (made by Glen and Ross), Nasmyth's, and Condie's—and there are two forge furnaces working to each hammer. The following are a few of the pieces of work in progress at the time of our last visit to the forge:—A crank shaft for H.M. ship Agamemnon (which, with the Achilles, is having compound engines substituted for her original engines); propeller shafts for Laird, of Birkenhead; cranks for Germany and Russia; a crank for one of the Pacific liners, building by John Elder and Co. (about 13 tons in the finished state, but about 26 tons in the rough forging); a stern frame for Napier and Sons; a rudder (one of five) for Harland and Wulff, Belfast; two crank shafts for Earle, of Hull; a stern frame for Barclay, Curle, and Co.; a stern frame of 18 tons for an Allan liner, building by Steele, of Greenock, one of the largest vessels yet built on the Clyde; a rudder for a gun-boat building on the Thames, by Dudgeon; a propeller shaft for the largest Anchor liner yet built, &c. Indeed, almost all the marine engineers are in the company's books. The finished forgings sent out annually from the Lancefield very nearly reach 3000 tons. About one-third of the work executed is sent to England, Ireland, or abroad, the remainder being for local firms.

Almost all the forgings for the Cunard steamers have been made at the Lancefield. There are fully 300 persons employed in the forge, and many of them make excellent wages. The labourers are paid from 16s. to 19s. per week, but the skilled workmen in the forge proper are, of course, far beyond the largest of those sums. The forgemasters, as they are called—that is, the men who superintend the hammering operations—can earn from 15s. to 20s. per day; they are paid so much per ton. There are several lines of rails laid through the works, and a siding is made to communicate with these and the Caledonian Railway system immediately outside the works. Lancefield Forge is one of the largest and most complete works of the sort in the world. It was in it (while in Lancefield-street) that the stern-frame weighing 25 tons, the crank-shaft 31 tons, and the propeller-shaft 47 feet long and 35 tons in weight, were forged for the Great Eastern steam-ship. Those forgings have not yet been exceeded in magnitude at any forge, but the Lancefield is still ready to execute equally large pieces of work. We have left ourselves no space to speak of the wonderful appliances in the mechanical shop where the forgings are finished, and of many other interesting things about the Lancefield Forge, but we have said enough to show that it forms not only an important industrial feature of the South Side, but that it is also a credit to Glasgow engineering and industrial enterprise.

VICTORIA STREET FOUNDRY, PORT EGLINTON.

Messrs. Finlay and Davidson's foundry was commenced 11 years ago. It is of very great extent, and affords employment to about 230 work-people, which is to be regarded as a large number when the special kind of work executed is taken into consideration. It was in a great measure called into existence by the large increase in the marine engine trade of the Clyde, and the manufacture of sugar mills. As might be inferred, therefore, the work executed is almost exclusively the heavy castings required in those two branches of the engineering trade—their chief customers being such well-known firms as Messrs. Robert Napier and Sons, John Elder and Co., David Rowan, James Howden and Co., Humphrey Tennant, of London, Barclay, Curle, and Co., Henderson, Coulborn, and Co., Renfrew; Mirrlees, Taits and Watson; W. and A. M'Onie, &c. For most of these firms there was work in hands at time of our visit, and for one of them alone there was 14 cylinders completing an order of 18. Besides steam-cylinders, the castings include condensers, screw propellers, heavy wheels, sugar mill rollers, sugar mill checks, &c.; and frequently the castings are of great weight—15 to 20 or 25 tons. Immense strength is required in most of these objects, and hence the very best qualities of pig-iron must be used, such as Gartsherrie and Coltness, among Scotch brands, while large quantities of hematite pig from Cumberland are also used, and sometimes even Swedish pig-iron, at from 6l. to 7l. per ton. At one time Messrs. Finlay and Davidson did a good deal of work in making castings for oilworks, but this branch of trade has largely betaken itself to Coatbridge, where labour and rent are both cheaper than in Glasgow. The loam moulder generally require to be men of very considerable manipulative skill, and in accordance with that fact they are paid a high rate of wages, some of them receiving up to 39s. per week. From 27s. to 34s. per week is given to the green sand moulders. Since the compound marine engines came into vogue a great amount of skill than formerly has come into requisition owing to the more complex character of the castings. In such a case piece-work is quite impracticable, and Messrs. Finlay and Davidson have none of it.

EGLINTON FOUNDRY.

The Eglinton Foundry, situated on the south bank of the Glasgow and Paisley Canal, and at the top of West-street, is almost exclusively given up to the pipe trade. It is about 17 years since the Eglinton Foundry started into existence, but within that time it has been extended to about four times its original size. The pipe founding trade, as indicated in our first article, has its head-quarters in Glasgow, and Messrs. M'Laren and Co. have a very large share of it. The Liverpool market is almost entirely supplied with gas and water-pipes from this city. Local, provincial, English, Irish, and foreign and colonial orders are executed by Messrs. M'Laren and Co. They did all the recent extensions that have been made by the Glasgow Water Commissioners; they likewise supplied the gas-pipes for the extension to Govan; and they are engaged in, or have lately completed, a large contract for the Nagpore waterworks.

There are great facilities at the Eglinton Foundry for carrying on this branch of trade, as may be inferred when it is mentioned that the daily produce of pipes is from 40 to 50 tons, the diameter of the pipes varying from 3 in. to 3 ft. There are two cupola furnaces in constant use, and for injecting the required air into them there is a Root's patent blower—a very valuable mechanical appliance. Messrs. M'Laren and Co. being the second firm to adopt it in this city. Kind's method of turning and boring the pipes, so that the joints may be made perfectly tight without the use of lead, is in use, and there are no fewer than five of the turning and jointing machines in use in the Eglinton Foundry. There are also three testing machines, and both kinds of appliances are so complete that a 5-ft. pipe may be successfully jointed and tested. Steam-power is applied to eight of the cranes, the others in the jobbing-shops being hand-wrought. Messrs. M'Laren and Co. employ about 250 hands, some on piecework and the others on weekly wages. The works are provided with a branch railway from the Caledonian system, which is of great value both to the proprietors of the works and the railway company.—*North British Daily Mail.*

CHEAP FUEL—COMPRESSED SLACK COAL.

So many processes have been noticed as promising to supply a ready and practical method of burning bituminous or anthracite coal "slack," dust, or waste, as it is variously entitled, that the subject is approached with doubt and incredulity, especially as most of the previous processes have been failures. The process of M. Emile Loiseau, now on trial in Philadelphia, offers the most practical and economical results yet obtained, and suggests the accomplishment of the desideratum. Inasmuch as the waste in all coal mining is fully equal to 50 per cent. of the amount mined, and that of this waste a small proportion can only be utilised, and that of bituminous, renders the success of any process for the practical consumption of the waste of immense importance. In the anthracite regions the waste is not only perfectly valueless, but a positive nuisance, estimated in amount at 15,000,000 tons, and of course increasing in exact proportion to the amount of coal mined. The only successful combinations of waste to form an artificial fuel yet used have been in England and on the Continent, where bituminous slack has been mixed with coal tar.

The first manufacture of this artificial fuel was originated at Moritigny sur Sambre, Belgium, by a Monsieur Debaynin, from Paris, 11 years since. There are now two manufactures in Belguim, and two in France, with a product in 1870 of 1,200,000 tons, of which the railroad companies consumed 931,600 tons, the navy 250,000 tons, and other industries 70,000 tons. Of the railroads, the Paris, Lyons, and Mediterranean consumes the artificial fuel exclusively, using 1200 tons per day. The Northern Railroad Company of France, running between Paris, Amiens, Dunkirk, and Calais, consumes 300 tons of pressed fuel daily. The scarcity of coal tar, however, has prevented the establishment of other factories for extending the manufacture of this artificial fuel.

The objections to this fuel as made in Europe are the amount of smoke and bad odour, thus entirely unfitting it for domestic use, and restricting the employment of it by manufactories under certain regulations. The importance of converting coal dust into lump coal was recognised by the United States Commission to the Paris Exposition of 1867, in the report of which the subject was treated at length. The advantages recognised in the use of the pressed coal by the Commission were as follows:—

"Its purity and compactness adapt it to the rapid production of steam in furnaces and small fire-grates, and it is, therefore, a desirable fuel for steamers and locomotives, for which it is largely used in Europe. Being manufactued in prismatic form it can be very compactly stored on shipboard or elsewhere. It can readily be transported to great distances with very little waste, amounting, it is stated, to less than one-tenth the waste of ordinary coal, handled under similar circumstances. It is not injured by frost, snow, or rain. Bricks of pressed coal produce as much steam in locomotives as an equal weight of coke. It is much liked by firemen, especially for railway steam in ascending heavy grades. Soft bituminous coal, or the mixture in which it predominates, is generally used in the manufacture of pressed coal."

The reasons for the preference of bituminous coal for artificial fuel in Europe are stated by M. Loiseau as follows:—In France and Belgium the soft bituminous coal contains from 60 to 70 per cent. carbon, and costs twice as much as the hard coal, which contains only 30 to 40 per cent. of carbon, the balance being slate, schist, and other substances. The pressed bituminous slack is sold as high, and higher in some cases, than the bituminous lump coal. In this country, on the contrary, the bituminous coal contains from 40 to 60 per cent. of carbon, and is sold low, while the anthracite coal, with 80 to 95 per cent. of carbon, rules at double the price of bituminous. From these causes most of the experiments in this country have been made with anthracite waste.

In the various attempts made to produce a solid combustible from slack coal the substances used have been coal tar, petroleum, asphaltum, resins, solutions of glue, alkalis, silicates, magnesium, grahamite, and the residuum of oil. The causes of failure have been the high price of the ingredients, which so added to the cost of the product as to prevent it entering into competition with lump coal in the case of bituminous; and in anthracite another difficulty has arisen, which was to prevent the combination slacking or falling to pieces in the fire before it was consumed. In the combinations of pitch, tar, resin, &c., with anthracite slack, pressure has been used to render the product compact, which M. Loiseau believes improper, because, no matter how hard the mass, the fire will penetrate it and consume the resinous substances before half of the heating power of the coal has been attained. The resinous substance once consumed, the coal-dust falls through the grate bars. M. Loiseau, who has had an experience of five years among the largest mines of Belgium, states that the inventor of the artificial fuel of Europe, M. Dehaynen, has entirely failed to solidify waste, in combination with pitch or resin, after numerous trials. The admixture of yellow clay with any kind of

slack to the extent of 30 to 40 per cent. of clay, is common in France and Germany among the working population, and while so large a percentage of clay of course greatly reduces the combustible qualities of the coal, still a tolerable fire is preserved. The fuel thus made must be preserved from the weather, as wet dissolves it. To reduce the percentage of clay used, and produce a perfectly water-proof fuel, has been the object of M. Loiseau's efforts for the past three years, now happily successful. By a peculiar method of mixing and working the mixture, he has succeeded in reducing the proportion of clay with bituminous slack to 8 per cent., and the fuel is further rendered water-proof by a composition of his invention. This fuel has been manufactured and sold in Nashville, Tenn., for the last four months, made from the Sewanee slack coal of the region. The cost of ingredients and labour does not exceed, in this case, $1 per ton. The application of this process to anthracite waste has been lately made in Philadelphia by the inventor, with a possible reduction of percentage of clay to 5 per cent., although 7 per cent. is used as yet in general manufacture.

The process of rendering the fuel water-proof consists of dipping the prepared balls, or blocks, into a liquid composed of 18 lbs. resin and 3 gallons of gasoline, or benzine, to the ton of fuel. The coal is sufficiently compact to admit of handling, transportation, and storing, and yet open enough to permit of the production of the necessary gases to ensure combustion. Practically, the fuel burns perfectly, leaves but a small amount of fine ash and no cinder, produces an intense heat, ignites readily, requires no attention for 24 hours, nor other arrangement for consumption or draft than possessed in all stoves or furnaces. It further maintains its integrity of shape until thoroughly consumed, requiring no raking, and the ash falling regularly through the interstices of the mass. Tried in the cupola and heating furnace, it is pronounced superior to lump coal, and must enter largely into the industries as a cheap, powerful, and reliable combustible. This fuel, made by hand, is now retailed at $5 per ton, but can be manufactured on a large scale, to admit of a fair profit to be retailed at $3 per ton on the seaboard. As a means of utilising waste coal it certainly seems to be a success, and bids fair to offer the solution of the problem of cheap fuel.—*Iron Age* (U.S.)

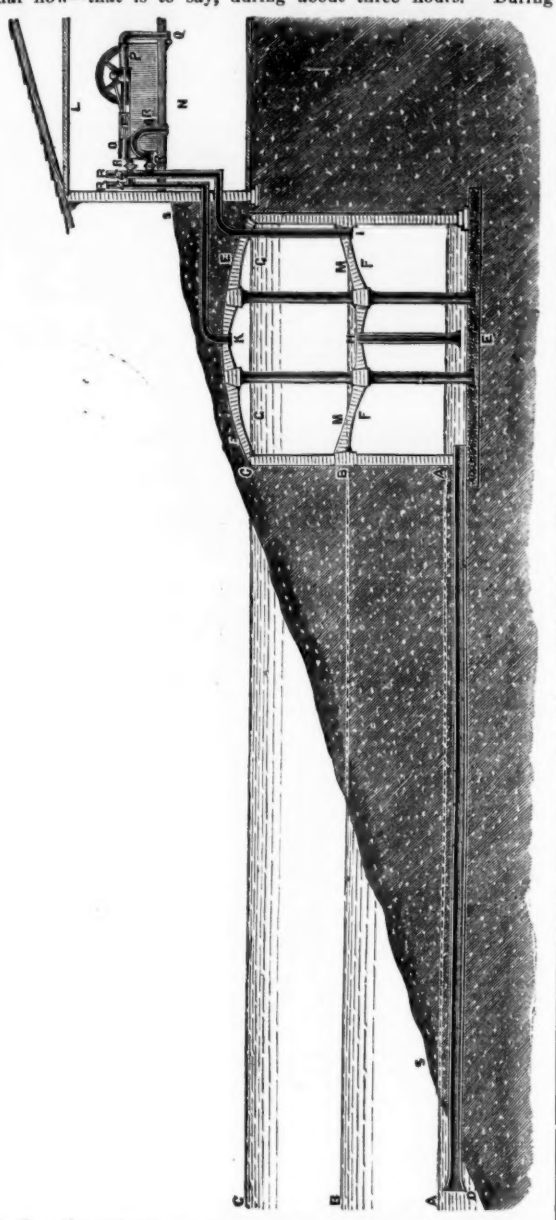
MOTIVE-POWER WITHOUT COST.

The economic production of motive-power is a matter in which almost everyone is more or less interested, and the introduction of a motor involving no other outlay than that required to make good the wear and tear of the apparatus used must confer advantages that will be appreciated by all. In a former notice of the International Exhibition it was mentioned that the model of Mr. Tommasi's apparatus for utilising the ebb and flow of the tides had been broken, and that an opinion upon its merits could not, therefore, be formed. The Exhibition has now assumed a more attractive aspect, and a visit would be well repaid to those interested in the use of motive-power, if only to inspect the working of the model of the "flux-motor," which could, no doubt, be very extensively adopted in connection both with mining and other industrial works carried on in the neighbourhood of the sea coast or of a tidal river. For the larger purposes to which steam is applied the flux-motor would, of course, not be adapted, but up to four or five horse-power no serious difficulties would have to be encountered. Where the rise and fall of the tide averages 10 or 12 yards such a motive-power might be very extensively used for such purposes as operating dressing machinery, or for the haulage of material, &c., for shipment at a port, the advantage being greater in proportion to the average height of the tide.

To those unaccustomed to study the subject a tide rising 12 yards appears to be enormous; yet it seems that at many places round our coast this height is considerably exceeded, though in some places it is lower, yet still sufficient to put the flux-motor in action. Thus, at Brighton the average tide is 10 ft.; at Bristol, 42; Cork, 18; Dover, 20; Leith, 15; Liverpool, 27; London Bridge, 19; Milford, 36; Plymouth, 18; Portsmouth, 18; Gravesend, 16; Torbay, 20; and Chepstow, 60 ft.; these figures presenting certain peculiarities which show that there is ample room for the exercise of intelligence in the choice of localities for the apparatus. At Gravesend, for example, the tide rises and falls but 16 ft., whilst at London Bridge, farther from the sea on the same river, there is a 19 ft. tide. At Bristol, again, the rise and fall is 42 ft., though at Chepstow it is 60 ft. These, however, are merely details, which would have to be considered in each particular case, and which would not in any degree affect the principle of the apparatus or its construction. Where the average fall and rise of the tide is 36 ft. the pressure produced in the reservoir would be rather more than half an atmosphere, and the size of the reservoir would require to be of 420 cubic yards in dimensions for every horse-power, a reservoir 45 ft. diameter, and adapted to a 36-ft. tide, would have a dimension of 2119 cubic yards, and would be equal to a little more than 5-horse power. It is proposed by the inventor to apply the apparatus for the compression of air on a large scale, and to lay on to distant factories, &c., the compressed air from suitable mains, in the same manner as gas is already supplied for the purposes of illumination, but the majority of practical men will probably conclude that in the first instance at least the system should be applied to individual works.

Suppose, then, a case occurs in which a 5-horse engine can be economically used, the first question which naturally suggests itself is the outlay which the construction of a flux-motor will involve, and to answer this Mr. Tommasi has prepared a very careful estimate of every item of expense. The same cofferdams can be used for several reservoirs, but the inventor charges the construction and wear at 24*l.* Then there will be 2296 cubic yards of excavations, which at 10d. per cubic yard will cost 90*l.* The cylindrical wall will be 47 yards long, 12 yards high, and 1 ft. thick, costing, at 1*l.* 6s. per cubic pard, 244*l.* 8s., and the roofs will cost 152*l.* 2s. more. The concrete foundation, which he puts down at the apparently excessive price of 12s. per cubic yard, is estimated at 105*l.* 12s., and the cast-iron columns, iron girders, pipes, &c., would cost about 160*l.*, raising the total, including 23*l.* 18s. for contingencies, to 800*l.*, being at the rate of 160*l.* per horse-power. The wear and tear of the reservoir would be very small, so small indeed as to be scarcely appreciable; the wear and tear of the engine is, of course, about the same as with an ordinary steam-engine of similar size and construction. It is remarked that the force derived from the flux-motor may be applied to all kinds of industry, even to those where, on account of the inflammable nature of the substance to be worked, it is impossible to use steam. It is not affected by atmospheric variations, such as arise from decrease of water in rivers and waterfalls, and, moreover, it can never fail in its effects.

In the annexed diagram A is the level of average low water during the spring tides; B, level of the point which serves as a base of the unit of height; C, level of average high water during the springs; D, pipe of communication between the reservoir and the sea; E, reservoir; F, lower compartment; G, upper compartment; H, tube of communication between the upper compartment and the sea; I, tube of communication between the lower compartment and the feeding-tube of the motor apparatus; K, tube of communication between the upper compartment and the discharge-tube of the same apparatus; L, factory; M, horizontal division; N, reserve compartment; O, cylinder, with piston of motor apparatus; P, pump for compressing the air; Q, valve; R, cocks; and S, the shore. The acting force being at one of the levels above A, and the generator of force at F and G, the engine is at L, above a compartment of reserved force N; and the force operates, and the movement is transmitted, as will be now explained. Let the sea be at the level A. There being the junction by the pipe, D, there will, of course, be a corresponding level in the lower compartment of the reservoir, as shown in the illustration. There is a pipe of communication between the two compartments of the reservoir, as shown, the lower end of the pipe being submerged; and there are pipes for the escape of air from the compartments; the upper ends of the latter pipes are provided with stop-cocks. As the tide rises from A to B, the air contained in the compartment, F, having no issue by the pipe, H, of which the orifice is submerged, and none by the pipe, I, of which the stop-cock will have been closed, is compressed proportionately to the weight of a column of water of the sea. "By putting, then," according to the inventor, "this compressed air into communication with the feeding-pipe of a machine similar to the steam-engine, and constructed in the proportions which would have due relation with the pressure and with the quantity of work desired, the machine will set itself in motion, and will continue to work up to the termination of the tidal flow—that is to say, during about three hours." During



this time the water freely penetrates by the pipe, H, into the compartment, G—the pipe, K, being at the time in communication with the external air, and it fills the compartment, G, up to a level corresponding with the level of the sea. But the cock (one of those lettered R) which is on the pipe, K, is closed, whereby the escape of the water into the compartment, G, is prevented. Then as the sea descends to the level, B, the water suspended, as it were, in the compartment, G, rarefies by the effect of its weight the air between it and the machine, and it results that on placing the feeding pipe of the machine in communication with the external air, and its discharging tube in communication with the tube, K, the weight of the exterior air upon the piston of the machine will be more or less considerable, according to the degree of rarefaction of the air in the tube, K.

This rarefaction being proportionate to the weight represented by the height of the water in the compartment, G, and this height being the same as that of the water which, a short time before, exerted its pressure (at the rising tide), the pressure of the exterior air on the piston, and consequently the degree of work which results from it, will be the same as that of the compressed air, and will continue so to the end of the ebb, or reflux—that is, for about three hours. By the means described there will be about three hours of work and three hours of rest. For the branches of industry to which such intermittent work would not be adapted a machine would be constructed with two cylinders at right angles, to which would be added a certain number of pumps worked directly by its piston-motors, O and P; and the tides occurring during the night, and on Sundays, would be turned to account and made to compress, by means of those pumps, the largest possible quantity of air, and to force it into the reserve compartment, N, which would be, in fact, the underground-storey of the engine-house or factory. On the necessity arising for motive power from the machine during the three hours, a cylinder and its pumps would be taken from the machine and placed in communication with the reserve; when the compressed air there would furnish the power.

FOREIGN MINING AND METALLURGY.

The Belgian ironworks are running off their production tolerably regularly, and the order books are so full as to assure work for sometime to come; rails, however, are not in such good demand as could be wished. Considerable quantities of Belgian iron are being forwarded into Germany. At Liége refining pig, hard iron, is quoted at 3*l.* per ton; spiegeleisen, 4*l.*; merchants' iron, No. 1, 7*l.* 4s.; ditto, No. 2, 7*l.* 16s.; ditto, No. 3, 8*l.* 8s. Plates, No. 2, have made, 9*l.* 4s.; ditto, No. 3, 10*l.* per ton. In the Charleroi basin, No. 5, casting pig is quoted at 3*l.* 14s.; ditto, No. 4, 3*l.* 16s.; ditto No. 3, 3*l.* 18s.; ditto, No. 2, 4*l.*; ditto, No. 1, 4*l.* 2s. per ton. White refining pig for rails has made 2*l.* 12s.; ditto, for iron in bars, 3*l.* to 3*l.* 2s.; grey ditto, for fine-grained iron, 3*l.* 14s.; spiegeleisen, 4*l.* per ton. As regards iron, first class, No. 1, has made 6*l.* 12s.; ditto, No. 2, 7*l.* 4s.; ditto, No. 3, 7*l.* 16s.; ditto, No. 4, 8*l.* 12s. per ton. Common or No. 2 plates are quoted at 9*l.* 4s.; ditto, boiler or No. 3 plates, 10*l.*; ditto, No. 4, 12*l.* per ton. In the course of 1869 the Great Central Belgian Railway Company made a trial of steel rails at certain points of its network where the traffic is heaviest. The results obtained were very satisfactory, and in 1870 some new applications of Bessemer rails were made. The use of iron sleepers is also increasing upon the Great Central Belgian lines. The average cost of the rails brought into use last year upon the Great Central Belgian system was 6*l.* 16s. per ton,—a little over rather than otherwise. By a royal decree, the Strépy Bracquegnies Colliery Company has been authorised to add to its works on the territory of the commune of Strépy a third blast-furnace, to be worked with coke, 200 coke-ovens on the Dulait system, an establishment for the preparation of coal worked by six steam-engines, supplied by four boilers, ten other vertical steam-engines of 30-horse power, and other appliances.

A meeting of Rhenish and Westphalian ironmasters, just held at Limbourg-on-the-Lenne, has resolved, in consideration of the continued rise in the price of rough iron as well as coal, to make some advance in the price of iron and plates. Tenders have just been opened at Pesth for 20 locomotives and 262 railway carriages and trucks of various kinds. The tenders for the locomotives required were received from the Vienna Company for the Manufacture of Locomotives, the Brussels General Company for Working Railways, and Herr Sigl, of Vienna. Herr Sigl required 2450*l.* for a locomotive of the first class, 3340*l.* for one of the second or third class, and 4080*l.* for a locomotive of the fourth class. He undertook to reduce these rates to the extent of 50*l.* or 100*l.* per engine on condition of certain changes being made in the specifications. Tenders were delivered by manufactories at Hanover, Konigsberg, Brussels, and Neuhausen (Switzerland), as well as by an English establishment and a French establishment. The lowest tenders for goods trucks were delivered by the Teplitz manufactory, and the lowest tenders for passenger carriages by the Vienna Carriage and Street Railway Building Company.

The French coal trade appears to be regaining something of the animation of last year. The extraction in the Nord and the Pas-de-Calais is being developed as much as possible. The deliveries of Belgian coal to France are increasing. In the Essen (Prussia) district the coal trade is also considered to be in a favourable state, a great demand being anticipated for the purposes of metallurgical industry.

At Havre, Chilian and Peruvian copper (bars) has made 69*l.* to 70*l.* per ton; refined ditto in ingots, 77*l.* to 80*l.*; and Corocoro mineral (pure copper), 71*l.* to 72*l.* per ton. United States copper has made default at Havre, and prices are nominal. At Marseilles, Spanish has brought 70*l.*; refined Chilian and Peruvian, 74*l.*; rolled red copper, in sheets, 80*l.*; ditto in rounds, 84*l.* per ton. The article has remained stationary upon the German markets; at Hamburg there has, however, been a little more activity, and prices have displayed a certain upward tendency. At Marseilles Banca tin is quoted at 148*l.*, and English at 152*l.* per ton. The German tin markets have followed the English and Dutch, and have displayed an upward tendency. At Havre soft Spanish lead, first fusion, has realised 18*l.* 16s. to 18*l.* 18s. per ton. At Marseilles, lead in saumons, first fusion, has realised 17*l.* 16s.; ditto, second fusion, 17*l.* 6s.; and lead in shot, 20*l.* 8s. per ton. The article has not attracted much attention upon the German markets; in Holland it has experienced no change. Little has been passing in zinc at Havre. At Marseilles zinc in plates re-cast has realised 18*l.* 16s., and rolled zinc 28*l.* per ton. At Cologne the zinc market has been quiet, but at Berlin the article has been rather more active. The Breslau zinc market has presented no special feature.

There is nothing very particular to communicate with reference to the iron trade in the Haute Marne; an improvement in affairs is every day making itself more strongly felt, but a general revival will only take place with the complete re-establishment of the railway slow train service. This was expected to be effected, so far as the Eastern of France Railway is concerned, on the 20th inst. Since July 8 two regular goods trains have been working on the line from St. Dizier to Vassy; between Eclaron and St. Dizier some supplementary trains have also been run. Merchants' iron and castings appear to be in rather less demand; the only orders which the forge-masters receive come from Paris and the South, the only points to which deliveries can be made with full efficiency. The falling off experienced in orders for merchants' iron and castings arises from the want of rolling-stock, and the difficulty experienced in making deliveries to all the towns which the Champagne markets ordinarily supply. The Germans hold many of the railway stations, and maintain an exclusive control over them; the Eastern of France Company has represented to the Government that this state of things is very prejudicial to commerce, and hopes are entertained that it will soon cease. A rather important contract for finished axles was obtained last week in the Haute-Marne district. The new Marnaval works are not yet in a condition to accept orders for merchants' iron, axles, machine iron, &c. The state of affairs in the Moselle, the Nord, the Meurthe, and the Meuse continues unchanged; orders appear to be every day becoming moré abundant, and the forges, blast furnaces, and foundries are working as much as their means of production will allow in order to meet the demand for autumn and winter consumption. All hopes are now lost of seeing France preserve the Moyeuvre Works, belonging to MM. de Wendel, while the Herserange Works will not become German. The French ironworks annexed to Germany are the following:—The Styring, Hayange, and Moyeuvre establishments, belonging to the house of De Wendel and Co., the Ottange blast-furnaces and forges, worked by MM. Jahiet, Gorand, Lamotte and Co.; the establishments of Arsur-Moselle, belonging some to MM. Dupont and Dreyfus, and others to MM. Karcher and Westermann; the Noveant blast furnaces, belonging to the Aulnoye-lez-Berlaimont Company; and the Heming Works, carried on for the last ten years by M. Lemonnier. These various works comprise 160 puddling-furnaces and 200 blast-furnaces, and their production of rails and iron of every kind amounted to about 140,000 tons per annum. Other French groups will probably make good the deficiency thus occasioned in the national production of France; the Nord will manufacture rails, the Meurthe will produce pig, the Haute-Marne rails and pig, and the Ardennes iron.

UNITED STATES MINING NEWS.

WHITE PINE.—In the Ward Beecher (the property of the Eberhardt and Aurora Company) the ore in sight is pronounced by competent judges sufficient to keep the 60 stamps of the International Mill running for the next six months.—The Ward Beecher Consolidated is constantly shipping ore to the Manhattan and Dayton Mills. The ore shoot is completed, and everything about the mine is rapidly getting in shape for active working.—The South Aurora is getting good ore, which is being daily shipped to the Stanford Mill.—The O. H., Treasure, Silver Wave, Silver Wedge, and other mines at the north end of the ore channel are all developing fine bodies of ore. The tramway continues to run regularly, carrying large quantities of ore from the Ward Beecher, North Aurora and Eberhardt to the International Mill, but notwithstanding this there is a large number of quartz teams employed. Many more good miners than are now here can readily obtain employment.—In the hills west of Hamilton some very good mines are developing.—The Silver Plate, Truckee, and Bowie are sending high-grade ore regularly to the Big Smoky Mill. The bullion shipments for the week amount to $21,976·69.

ARIZONA.—The Tiger is being worked upon for a distance of six miles, and the ore from every shaft and tunnel is rich in silver and gold. The same is true of the Lion, Lioness, Cougar, Gray Eagle, Eclipse, Badger, Bradshaw, Del Pasco, Yreka, Hunter, Lorena, and other ledges. Scores of mining experts from Nevada and California have visited these mines, and have said sufficient to satisfy us that they looked upon Bradshaw district as the greatest find ever made in any country.—We have good reports from the Davis Mine, Hassayampa district, which at a depth of over 10 ft. is 9 ft. thick, and exceedingly rich.—From Big Bug, Walker, Weaver, Turkey Creek, Black Canyon, Black Hill, Santa Maria, the distant Wallapai, Salt and Colorado river district come cries of "rich rock, and plenty of it."—Mr. W. T. Boyd writes from Mill city that a party of prospectors recently discovered two rich gold ledges a short distance south. "We have tested only one of the ledges, which gives $50 per ton in free gold."

PLUMAS COUNTY.—The Boardman tunnel in which big prospects were recently obtained, and which proves the existence of a very rich gravel range between La Porte and Gibsonville, has turned out to be too low, and arrangements have been made to run a new tunnel. Some very rich claims will undoubtedly be opened.—The Eureka is paying out $1000 per day.

SIERRA COUNTY.—Johnson and Co. have discovered another rich quartz ledge near American Hill. Some of the richest specimens ever found in this county have been taken out, consisting of solid chunks of pure gold.

TUOLUMNE COUNTY.—We were shown at Wells, Fargo, and Co.'s a lot of gold amounting to $5000, the result of three days' labour for two men in a pocket vein near Tuttletown.—At Mosquito Gulch 12 tons of rock from the mine of Teusch and Mischler yielded $1505, retorted gold. This is an average of $125·41 per ton. The quartz was crushed in Harris's mill at Sandy Gulch. Some of the richest pieces of rock we ever saw were recently shown us from the mine of Hoerchner, Siegler, and Keyes. The pieces were about equally composed of gold and quartz. The mining interest is more promising for the future, and in a more favourable condition at present than for years.

NEVADA COUNTY.—The consolidated claims of Messrs. Bowen, Davis, Beach, and others are being vigorously worked. These claims are paying handsome dividends. A few days ago they cleaned up but five boxes, and took out $1700 in 20 days' run. The claims are worked with the Hopkins' pipe.

PLACER COUNTY.—From Michigan Bluff, Turkey Hill, and Last Chance the reports for the past week are encouraging in the extreme.—From the Weske claim—20 men working six days—the yield left to the owner a dividend of $4030 for the week. Weske now has about 4 ft. in depth of pay dirt, and there is every indication that he is on the eve of striking the main channel, when he is sanguine of a deposit far surpassing anything he has yet worked. Last Saturday Hon. John Yule brought over from his claims near Last Chance to Michigan Bluff $1740, the product of 158 days' work on the time-table. This gives $36·75 per man per day as the yield of the Weske, and $13·60 per man per day as the yield of the Yule claim, making no allowance for considerable dead work in both claims. In addition to the above, the Van Emmon brothers last week cleaned up 106 ozs. in the Big Gun claims, Michigan Bluff.—Dutch Flat: Gold Run Cor. of same: I learn that Mallord has made a very profitable run. With four men and 300 in. of water he realised $175 per day. This in bottom ground only, having one small cave from the main bank. A miner from Bear River informed me that very rich diggings have been discovered 12 miles above this place. He reports many prospectors at work.—Quartz Mill Sold—*Herald*, June 17: We learn that the St. Patrick Company has bought from John McFadden the Empire Quartz Mill, in Ophir district.

YUBA COUNTY.—The two main companies at Camptonville are doing well.

Jones and Co. and Hugg and Co. are both working a full force, and reaping a fair return. Water is plentiful. The little towns of Railroad, Young's Hill, Brandy City, and other camps, are all prosperous.

NEVADA.—At Mountain prospects never looked better.—The Independent is the richest mine on the coast. Sam Hendy's mine, the Pride of the West, is second to none. On Wednesday, at the depth of 70 feet, the workmen struck an almost solid mass of silver.—The Mountain City Mine is in the near vicinity, and the company will soon be taking out rich ore.—The Argenta struck an 8-ft. ledge a few days since in its lower tunnel.

ELY DISTRICT.—Wells, Fargo, and Co. shipped, on June 12 and 14, by way of Salt Lake, bullion valued at $35,465·96.

EUREKA DISTRICT.—The Phœnix Company has purchased the Jenny Lynch Mine at a round price. It is one of the latest discoveries made.—Judge Delos Lake, of San Francisco, has purchased the Otho Mine for $12,000 coin.—In Spring Valley district, 10 miles west of Eureka, 200 mines have been recorded, and all of them more or less worked. The ore has been milled at Austin, and has paid a large profit, even with the expense of 65 miles of transportation, where there is no return lode.—El Dorado Mine has been sold by Daugherty and Capron to R. S. Bernard for $20,000. It is a good purchase.

IDAHO.—The Gold Hill Company's mill last Sunday, after a four weeks' run, cleaned up $18,000. The company has purchased the old Pioneer ledge from Mr. John Parham, paying him some $2500.—The assay office of B. M. Durrell and Co. assayed, during May, 152 gold bars, valued at $115,597·62. All this was basin dust, and the yield only of the first month of the season.

INYO COUNTY.—At Kearsage a rich strike has been made. At the lowest depth reached a body of ore 2 ft. wide has been opened, which is immensely rich. Before this development was made Mr. Lockhart, an experienced mining engineer, had estimated the value of the ore in sight at $1,400,000. The mill has been completely overhauled, and works to perfection. A 13½-in. Leffel wheel furnishes 40-horse power. The capacity of the mill is 30 tons per day.

COLORADO.—Ten tons from the J. J. Roe, shipped to New York, yielded 500 ozs. of silver per ton. Two lots of 8 and 11 tons, worked by Palmer and Nichols, gave 105 and 107 ozs. of silver per ton.—The Washington Mill is running to its full capacity, with a supply ahead from the Brown and Terrible lodes and the Monticello Tunnel ore. The cost of concentration by the Krom machine is $7 to $8 per ton, and the capacity of the works 10 tons per day.—The Caribou Mine to main shaft is now 185 ft. deep, and has a 5-ft. crevice. The assay value of the ore from 130 to 180 ft. is 300 ozs. The mine was discovered in the spring of 1870. Since when $240,000 worth of ore has been taken out, nearly all in developing the mine, for no stoping has been done in the last 80 ft., where the crevice is best. The Idaho lode gives an average of 32½ ozs. per ton.—The Marshall Company shipped during the past week 150 lbs. of silver bullion, the product of 3½ tons of ore from the O. K. lode.—Work is actively going on in the Marshall, Burleigh, Monticello, Eclipse, and several other tunnels.—In the St. Luke lode, Sherman Mountain, the pay streak is 10 in. in width, and the lowest assay has been $490 per ton.—Terrible ore at lower depths has less zinc and more lead.—Palmer and Nicholl's Reduction Works bullion total for the week $3555.—Last run of Mammoth ore returned 170 ozs. per ton.—Placer mining is in full blast in Summit county.—Skipper and Holt are working the Alamakee lode, Gold Hill. At a depth of 30 ft. the crevice averages 8 in. in width: 11 loads of ore from this mine, lately run at Bottolfson's Mill, yielded 90 ozs. of gold, or over 30 ozs. per cord.—The ore from the Puzzle lode, Bobtail Hill, yields under the stamps 20 ozs. of gold per cord.—Four cords of ore from the Beacon of the West, in Russell, gave 50 ozs. of fine gold.

UTAH.—The Miller Mine is well worth visiting, and is by far the largest deposit of ore which I have seen in Utah, considering the amount of work done, the discoverers having struck pay at the very surface. The mine is opened by two tunnels and an incline, the largest tunnel being 60 feet in length, following a solid body of ore all the way from the surface to the heading, where it now shows a vein 19 feet in thickness. At the time of our visit a portion of the mine had caved in owing to defective timbering, but, even when seen under this disadvantage, the body of ore exposed to view was simply enormous. Two miners with pick and shovel can easily keep two wheel-barrows busy running out ore to the dump, where five men are employed sacking it up, after which it is slid down a ravine on the snow to the gulch below. From 12 to 14 tons per day is the usual quantity taken out when worked in this way. When we consider that this ore will run from $90 to $150 per ton, and that the quantity which can be taken out when the mine is properly opened for working will be only limited by the means of transportation and reduction, we can hardly comprehend the true value of this mineral deposit. A tramway 800 feet in length can be easily and cheaply constructed from the mine to the base of the mountain, there connecting with a wagon-road built on a good grade down the creek to where the furnaces will be erected. The surrounding mountains are thickly covered with a heavy growth of pine, sufficient to furnish fuel in abundance for many years to come, and taking everything into consideration, I can see no possible chance for a failure, if worked by practical miners and economically managed. The Wyoming lode is situated, perhaps, 400 feet above the Miller, on the very crest of the mountain, and is supposed by many to be the same mine. A short drift has been run in on the vein from the east face of the hill, at the end of which a shaft has been sunk to a depth of 20 feet, disclosing a vein of ore 8 feet in width. It is nearly the same character as the Miller, being carbonates mixed with galena, and assays at the rate of $122 per ton. The owners are now drifting along the vein, and taking out sufficient quantities to ship had they only a good road to the mine. The Kentucky lode is nearly a mile further north on the same mountain. A shaft has been sunk to the depth of 25 feet from the surface, the ore vein being about 4 feet wide in the bottom. The mineral is coarse galena and honey-combed quartz, the value of which I did not learn, but it is probably not very rich.—A Salt Lake correspondent of the *Enterprise* writes (June 11) of the Emma Mine, that there are 150,000 tons of good smelting ore on the dump; and of Ophir district, that the best of the ores yield an average of $200 per ton, and there are many thousands of tons on dumps awaiting milling facilities, being not suitable for smelting.

FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received June 30, *via* Bordeaux, ex steamer Sindh:—

GOLD EXTRACTED TO DATE.—The produce from the mineral treated in the stamps during the second division of May, being a period of 10 days, amounts to 3177 oits. It has been derived as follows:—

	Oitavas.		Tons.	Oits. p. ton.
From General mineral	2346·3	from	1097·0	= 2·138
„ Gamba West ditto	830·8	„	272·0	= 3·054
Total	3177·1	„	1369·0	= 2·320

The above is better produce than was obtained in the first division of the month, both as regards standard yield and the daily return of gold from the mineral treated. The yield from the general mineral is improved a little.

HEALTH OF THE ESTABLISHMENT.—We are suffering from colds and bronchitis at present, owing probably to the sudden change we have had in the temperature, especially mornings and evenings. Otherwise the health of the establishment is remarkably good.

Morro Velho, June 1.—SINKING OF SHAFTS.—I beg leave now to advise you of the sinking effected at the new shafts during the month of May, the measurements having just been made to-day—viz.:

Sinking in the month.

A shaft	4 fm.	0 ft.	0 in.	=114 fms.	3 ft.	9 in. Total depth.
B shaft	6	0	3	=112	1	5 ditto.
Month's sinking	10	0	3			

Cross-cut from A shaft towards B shaft has been driven 5 feet.

The above sinking may be considered quite satisfactory, considering the hard "floors" of rock met with, more especially in the A shaft. Appearance of similar rock met with in B has not as yet proved so hard to bore or quarry as that encountered in the sump of A shaft.

Advices received July 19 ex steamer Oneida, *via* Southampton:—

Morro Velho, June 17.—GENERAL OPERATIONS.—During the past fortnight our general work has been carried on without interruption, and, on the whole, moderately good duty has been done.

PRODUCE FOR MAY.—The gold return for the month of May amounts to 10,810·3 oits. It has been derived as follows, viz.:—

	Oitavas.		Tons of stone.	Oits. p. ton.
From General mineral	7166·0	from	3518·0 =	2·037
„ Gamba (West) ditto	2745·8	„	864·0 =	3·176
	9911·8		4382·0 =	2·262
Arrastra produce 652·0 Praia ditto 215·5	867·5		=	0·198
Susanna stamps, coffers, &c.	31·0			
Total produce	10,810·3			2·460

There has been nearly 300 tons (286) more mineral stamped in May than was reduced in April. The standard yield of the mineral treated being practically the same, though the separate treatment of the Gamba West mineral has given a little better yield.

COST AND LOSS.

The produce for May being	10,810·3 oits.	
Less loss in melting	30·2 „	
Total	10,780·1, at 8s. per oit.	£4312 0 9
Cost—Labour Rs. 28,023 $927		
Other charges Rs. 19,912 $721		
Rs. 47,936 $648, at exchange 25¼d. per milrel		£5043 6 9
Loss on working in month of May		£ 731 6 0

FERNAM PAES ESTATE.

Outlay at Gaia level and tramroad	Rs. 486 $020, at ex. 25¼d.	£ 51 2 8

NEW SHAFTS AND SURFACE WORKS.

Outlay on surface works	Rs. 2,913 $345, at ex. 25¼d.	£ 306 10 3
Ditto sinking and timbering	Rs. 12,446 $708, „	1309 9 10
Total outlay		£1616 0 1

The Morro Velho cost, though not higher than has occurred in some previous months, is Rs. 5663 above the outlay in April, and this at our present increased rate of exchange has shown, I am sorry to record, a loss on the month's working of 731*l.* 6*s.*; nearly four contos of this increased cost is for labour. We had 27 working days in May, but our general charges have also been heavier than usual from circumstances not easily controlled.

MINES.—We have had a good attendance of natives during May, giving the following daily averages:—

Natives boring	162·15	Natives working	261·04
Others ditto	10·15	Others ditto	205·44
Total	172·30		466·48

Being an average of 25 more borers and 21 more natives working in May than in April. The mineral quarried and delivered at surface amounted to 6000 mine wagons, giving 34·80 wagons per borer employed.

In the GAMBA the sump has been sunk 3 ft. 6 in. vertically, and the stoping carried on throughout the mine. The sinking-lift has been lengthened 9 feet, and the timberwork generally attended to.

In the BANU the erection of the vertical pump has been completed, and it is now working, pumping from the old mines.

At the EAST CACHOEIRA the stoping has been carried on regularly, 1296 wagons of mineral having been obtained from this section.

GAIA MINE.—Very little progress has been made in opening the lode since it has been reached. It has been driven into up to the present about 12 feet, and is hard and tedious to quarry.

REDUCTION DEPARTMENT.—The general duty in the department may be summed up as follows:—

Stamps working 126 heads, average	30·29 days.
Stamps working daily, average	123·11 heads.
Arrastres each has worked—Morro Velho	25·95 days.
Arrastres each has worked—Praia	30·43 days.
Produce of each stamp-head per diem	2·597 oits.
Produce of each arrastra per diem—Morro Velho.	1·571 oits.
Produce of each arrastra per diem—Praia	1·184 oits.
Produce from re-treatment of sand	8·75 per cent.

The mineral reduced amounted to 4382 tons, and the sand passed through the amalgamation process, 7056 cubic feet, yielded an average of 1·50 oits. per cubic foot. The unrecovered gold contents are shown as 1·090 oits. per ton treated.

The unrecovered contents of mineral treated at the Susanna stamps by the dressing-bolt appears higher than from the general treatment in the straking process, but the speed of the bolt will be altered, with the view of effecting a better recovery.

SINKING OF SHAFTS.—The sinking accomplished during the first part (15 days) of this month is as follows. Sinking first 15 days of June:—

A shaft has been sunk	1 fms.	4 ft.	6 in.	
B ditto	2	3	3	
Total sinking	4	1	9	in the period.

The sump of A shaft continues hard and tough for blasting.

GOLD EXTRACTED TO DATE.—The produce from the mineral treated in the stamps during the first division of June, being a period of eight days, amounts to 2663·8 oits. It has been derived as follows:—

	Oitavas.		Tons.	Oits. p. ton.
From General mineral	1920·0	from	924·0 =	2·077
From Gamba West ditto	748·8	„	245·0 =	3·035
Total produce stamps	2663·8	„	1169·0 =	2·278

This is better produce than we obtained in the first division of May, both as regards standard yield and daily gold return.

The West Gamba maintains its mineral standard since the resumption of reworking it and treating it separately at the Addison stamps.

The health of the establishment continues good.

THE GOLD TROOP was dispatched the 12th June in charge of Senor A. M. da Rocha, taking five boxes, containing 13 bars, weighing in all 20,841 oitavas, equal to 200·226 pounds troy. The agents at Rio de Janeiro are instructed to ship the gold by the steamer Oneida on June 23.

N.B.—The gold duly arrived.

DON PEDRO NORTH DEL REY (Gold).—Mr. F. S. Symons reports for May—Produce and Cost: Produce, 5013 oits., at 8s. 6d. per oit., 2130*l.* 10*s.* 6*d.*; cost, 3977*l.* 4*s.* 8*d.*—1846*l.* 14*s.* 2*d.* Cost is heavy, owing to a large amount for timber and poles having been written off. Operations have progressed with regularity, and good duty accomplished; the lode excavated has been derived chiefly from Alice's west, and proved of low standard. I hope that next month's produce reported will be more satisfactory, as the ground in the bottom of the mine is drained, and communication to Vivian's cross-cut (now styled the 25 fm. level cross-cut) attained through the old sump-shaft, we shall be enabled to work on more remunerative ground. I have pleasure in endorsing the opinion expressed in the mine captain's report, "That they hope most of the difficulties have been got over, and that in future good returns will be made." The attendance has been fair, and the exploratory works manned, but no auriferous ground met with.—FIRST DIVISION OF JUNE: Extract from Mr. Symons's letter, dated June 17: Remittance, 11,818 oitavas (two months). Produce weighed to date, 4651 oitavas. Works have progressed satisfactorily, and box work has been taken from Curve and Canoa; plat has been finished at entrance of the 25 fm. level cross-cut, and stoping will be commenced in a day or two at northern part of No. 6 from old sump to extend northward towards general body curve. Some good strake work has been taken from eastern extremity of lode at Alice's west below level.

ANGLO-BRAZILIAN (Gold).—Mr. F. S. Symons reports for May—The produce for the month amounts to 1054 oits., or 121 ozs. troy: total cost for the month, 1353*l.* 17*s.* 4*d.*—First Division of June: Extract from Mr. Symons's letter, dated June 17: Remittance, 1722 oits. (two months). At Pitangze, in Hoskin's level, the ground is more favourable. Capt. Treloar has decided that the adit commenced by the ancient proprietors to encounter the Ouro Podre shoot shall be carried on with all speed, a 12-heads stamping-mill to be erected below Hoskin's level, and arrangements commenced for sinking on "Feo. Antonio's" shoot, which was being worked on until stopped by business of sale. Force has been and will be increased from Passagem.

GENERAL BRAZILIAN.—The usual despatches from Capt. Thomas Treloar have not yet been received.

ROSSA GRANDE (Gold).—Mr. Ernest Hilcke reports for May:—The sanitary state of force has been favourable. Operations have been carried on with regularity, and attendance of force fair. The works at the Bahu Mine have advanced in a satisfactory manner. At Cachoeira Mine in driving the adit level west, we have met with a pleasing improvement in the auriferous quality of the lode; this amelioration in the stone is certainly encouraging, more so as the place pointed out to me, where the lode is said to be left very rich, is still about 25 fathoms further west from our present end. Before proceeding to this latter place the real value of the lode now struck will be ascertained.—First Division of June: Extract from Mr. Ernest Hilcke's letter, dated June 16: Remittance, 1155 oits. Nothing of importance has occurred in the mine department during the last fortnight. In a supplementary report, Capt. Thomas Treloar says—"I was at Rossa Grande on the 12th instant, and I am pleased to say I found the works generally progressing satisfactorily."

SAO VICENTE.—Extract from Mr. T. C. Kitto's letter, dated June 17—Yesterday (the 16th) Captain Treloar handed over to me the title-deeds of the Sao Vicente and Brucutu properties, together with all the plant, &c., of the Sao Vicente Mine. While I was waiting for Capt. Treloar I put my men to work on several untried veins in the Sao Vicente, and I am pleased to say I found some very fair prospects of gold; but those veins at present are too small to pay dividends. Judging from the little I have seen, I am of opinion that the main lead has yet to be discovered, and the parties who succeed in so doing will be handsomely rewarded.

TAQUARIL (Gold).—Mr. T. S. Treloar, in his report for May, regrets to say there is no improvement upon the results for the last month. On the contrary, though a larger quantity of mineral has been treated the produce is still more unsatisfactory, and the features of the lodes show no sign of becoming more favourable. The gold return amounts to 324 oits., derived from 613 tons of stuff, thus giving an average yield of ·528 oits. per ton. No vein-stuff has been obtained. The stopes on under lode have been inaccessible during a part of the month, owing to presence of foul air. More of the upper lode, consequently, has been sent to the stamps, but both are very poor, and the shoots have presented no change for the better since last commented on. An alteration, doing away with the immediate necessity of fixing plunger, has been effected in the pitwork in Haymen's shaft. Explorations are progressing vigorously, but so far we have made no discovery. For the first division of June Mr. T. S. Treloar states that the mine is without any change needing remark. Regular stoping operations are going on upon both lodes, and the stamping-mill is doing good duty, but the auriferous quality of the mineral continues poor. Capt. Treloar inspected the works on June 14. By the Don Pedro troop there was forwarded for delivery to Messrs. John Moore and Company, Rio de Janeiro, a box containing 987 oits. of gold dust.

CHONTALES.—Mr. Belt, June 6: From my report last month you will have learned that the fear that San Antonio mine might be exhausted before we had sufficient ground opened out in the other mines to give the prospect of more permanent returns has been set at rest by the discovery of the large and profitable lode in San Benito east. Leaving this and other matters to which you refer to be discussed in their regular place, I shall now only remark that the lode in San Benito east has since my last report improved in value, and is now worth 7 dwts. per ton. After the dispatch of last mail the ore from San Antonio fell off in value, and did not improve again until last week. We stamped altogether, with 12 heads only, from San Antonio, San Benito west, and Santo Domingo 1175 tons, from which we have obtained 364·6 ozs. of gold; average yield 6 dwts. per ton. This we value at $5042, or 1008*l.* 10*s.* Our total cost has been $5442, or 1092*l.* 16*s.*, but this includes the large sum of $1470, or 294*l.*, for opening out San Benito east, Consuelo, and Sebastian mines, new tramway, new stamps, and freight of crusher. Deducting these items, we have the sum of $3994, or 798*l.* 16*s.*, as our total working cost, including the whole of the general and management expenses. The statement of expenditure and results will then stand thus:—Gold obtained, $5042, or 1008*l.* 10*s.*; working and general cost, $3994, or 798*l.* 16*s.*: total, 209*l.* 14*s.* Expenditure on new stamps and machinery, 294*l.* I am opening out the mines out of the profits, instead of new capital, and our position should not be made to appear worse than it is. It may be noted above that our general and working cost would have been covered by a yield of 5 dwts. only per ton of the 1175 tons treated, and the importance of the discovery at San Benito east of ore worth 7 dwts. per ton will be apparent, as the lode is so large, 17 ft. wide, and the ore so friable that it can be worked more cheaply than that we are now treating. At San Benito east we have, during the past month, put up a rise from our deep level to the surface, and at the top of this we are now driving a level east, as we wish to stope the top of the mine first. The lode has improved upon its former good appearance, and is now worth 7 dwts. per ton. We are pushing on the branch tramway as rapidly as possible, but it will take a month longer yet to complete. In the meantime we shall put the mine into complete working order, and be ready as soon as the tramway is completed to send down a large supply of ore to the stamps. You will observe that 12 square stamps only have been at work during the past month, and have stamped, as before stated, 1175 tons. Of the 12 new revolving-stamps eight are completed, and the other four only require the guides fixed. The connection with the water-wheel is also nearly finished, and we fully expect to set the stamps to work next week.

PINTO (Silver).—From Mr. W. A. Edwards, C.E., we learn the following particulars with regard to the immediate intentions of this new company. Mr. J. R. Partridge, of Hamilton, is the agent of the company, and Mr. James C. Powell superintendent of the mine. There will be a tunnel started at once, to strike below the present workings, which will be 540 ft. long, and will reach the line of the shaft 109 ft. below the lowest point reached, and will be 288 ft. below the surface. It is not as yet fully decided, but it is understood to be the intention of the company to put up a 40-stamps mill near the Maryland Wells station, which will be supplied with water from fresh springs, and water will be carried in pipes a distance of 14 miles. When the purchase was made by the present company there had been work done on the mine in shafts, inclines, drifts, and levels 649 feet. This work has been done during the last eighteen months, and the former owners made a clear profit beyond the cost of the mine and the price paid for labour of $100,000. The sale made by them to the English company was a profitable one; but from all indications there is no doubt that the stock will bear as high a price in the English market as the Eberhardt or any other Nevada mining stocks based upon silver mines. There are large bodies of ore now in the mine, and as it looks would furnish sufficient ore to run a 40-stamps mill.

Mr. F. G. Whitwham, the secretary, informs us, that on his return from Nevada Mr. Woodhouse confirmed his telegraphic and written reports in every respect, and produced certificates of the title deeds of the company's property, which he had examined in the Record Office of the State of Nevada, and found to be in perfect order. Professor Keyes, manager of the Buckeye and Champion Mines of Nevada, and Mr. Cadwallader, M.E., of Hamilton, accompanied Mr. Woodhouse, and their investigation on the spot confirmed the several statements set forth in the prospectus. All expenses of the mines up to June 19 have been defrayed by the vendors, while the produce up to that date, amounting to about 150 tons, has become the property of the company. The average value of these ores may be taken at about $200 per ton net, equal to 600*l.* sterling. On June 26 a contract was entered into with a first-class firm for the construction of a 20-stamps mill, to be completed by the end of November. This will cost 16,000*l.*, and another 2000*l.* will be required for the construction of roasting-furnaces. In the meantime, an arrangement has been entered into with Mr. R. E. Plater, a gentleman of considerable mining experience in Nevada, who has already taken charge of the company's property, and will superintend upon the spot the construction of the proposed works.

BIRDSEYE CREEK (Gold).—Telegram from their agent, July 20: "Cleaned up on Uncle Sam claim, after 32 days' run, and on Neece and West claim after 25 days' run. Profit $5000.

MINERAL HILL (Silver).—The annexed is from the managers. Messrs. John Taylor and Sons:—The following satisfactory intelligence has been received by the company by telegram from San Francisco, under date July 2:—"Mill run (commenced working) May 31, and June 1 broke machinery. Started again June 14 up to 24, net proceeds over $40,000 for 13 days. Running steadily since." By telegram from San Francisco, under date July 8:—"From June 25 to 30, six days, $19,000." Mr. John Taylor, jun., proceeded with Mr. Oakes, the company's manager, to take possession and management of the mine by the Cuba, American steamer, which sailed on July 15, and they are expected to reach the mines about Aug. 9 next. A contract has been entered into with Messrs. H. J. Booth and Co., of San Francisco, for the erection of a new 20-stamp mill, which, under penalties, is to be ready and at work by Oct. 8 next. Mr. John Taylor, jun., immediately on his arrival at San Francisco will make arrangements for the necessary further stamping-power.

ALMADA AND TIRITO.—*Telegram:* Clemes, June 24: Profit for May, $5722.

BATTLE MOUNTAIN.—Capt. Richards, June 29: Virgin: In the 113 ft. level, north of Hallow's shaft, and north of the cross-cut west of Roach's winze, the ground is hard and slow of progress, being still in cross-course ground, which, however, will soon change for the better, in my opinion. The ground in the bottom of Bishop's winze in the 113 is improving. In the 75 ft. level north the lode continues to produce some very good stones of green carbonate and red oxide occasionally, and is a very promising lode. A rise (Jury's) is being put up in the back of this level towards the 37, for the purpose of holing with, getting ventilation, and proving the lode, which is turning out some fine rocks of ore occasionally, a good-looking lode. The lode in Jack's stope in the back of this (75) level is a fine orey lode. In the 75 ft. level north the ground is favourable for the production of mineral, and the lode has produced during the past week some fine rocks of ore, and still looks exceeding promising. This end is approaching the point at which Jury's rise will come from the 75, and should, according to present appearances, open out some orey ground.—Lake Superior: Bryce's shaft has been sunk 65 ft., and is now at about the same depth as Hallow's shaft at Virgin, which is 113 ft. perpendicular. Ore raised 145 sacks.

ECLIPSE (Gold).—The following has been issued by the directors:—The box of ore from the 300 ft. level, referred to in Mr. Henry Tregella's report, under date June 1, has arrived, and the directors have now the pleasure to acquaint the proprietors that the following is the result of the assay—Gold, 20 ozs. 2 dwts. per ton of 20 cwts.; silver, 24 ozs. 6 dwts. per ton of 20 cwts.

UTAH.—Telegram from Salt Lake City:—Just returned, mines looking splendid, works prospering well, Nancarrow hard at work, success certain.

CUIABA.—June 14: Vivian's Level: During the month operations have been carried on uninterruptedly with success, showing strong indications of our near approach to the lode (one of sixteen upon the property); we have met with soft ground, interspersed with mundic (a most favourable sign), and are now in laminated ironstone, the covering of the lode.—Superficial Workings: A few hands have been excavating ore stone from these workings, which upon reduction yielded 296½ oits. of gold, yielding a profit of 35*l.* for the month.

LUSITANIAN.—Report for July: Palhal: In Taylor's engine-shaft, sinking below the 140 fm. level, the lode is worth 4 tons of ore per fathom, the western part being the richer. The lode has not been taken down in River's shaft, below the 110, but appears to be composed of quartz. In the rise above the 120, against River's shaft, the lode is 4 ft. wide, composed of quartz, yielding ½ ton of ore per fathom.—Levels on Basto's Lode: In the 140, east of Taylor's shaft, the lode is worth 2 tons per fathom; in the same level west the lode is 2 feet wide, and yields ½ ton per fathom. The men in the latter level have been taken from the 140 fm. level rise, in which the lode is poor. In the 130, east of Taylor's, the lode is 6 feet wide, composed of quartz; in the 130 west the lode is 1 ft. wide, containing small stones of ore. In the 120 east the lode is 8 feet wide, made up of quartz and ore, of which it produces ½ ton per fathom. In the 110, east of River's shaft, the lode is 2 feet wide, unproductive. In the 80 east the lode is 4 feet wide, composed of flookan and schists, with strings of ore worth ½ ton per fathom. The lode in the 70 east is also 4 feet wide, composed of quartz, spotted with lead. The lode in the adit, west of Perez' shaft, is divided into two parts, one of which keeps its regular course, while the other goes off to the north at a very rapid rate; both branches are poor. In Mill lode at the 38, east of Taylor's, is 1 ft. wide, composed of quartz and flookan.—Winzes: In No. 85 winze, under the 130, east of Taylor's, the lode is hard and unproductive; we hope to hole this winze in a few days. In No. 86, below the 90, east of River's shaft, the lode is 4 feet wide, composed of quartz. In No. 88, below the 28, west of Perez' shaft, the lode yields 1¼ ton per fathom.—Carvalhal: The ground in the 60 cross-cut is a hard, tough gneiss, spots of lead appearing at a string of quartz running with the end.—Levels on Great Lode: In the 6, east of incline shaft, the lode is 1 ft. wide, composed of quartz, and in the 50 east the lode is 2 feet wide, of the same character. The 50 west is suspended, the lode being unproductive. In the 40 east the lode is 1½ ft. wide, poor. The end of the west presents indications of proximity to the caunter lode. The lode in the 30 east is 4 feet wide, yielding ½ ton per fathom, but in the 20 east the lode is small and poor, and the driving has been suspended.—Levels on Caunter Lode: The lode in the adit level, west of incline shaft, is worth for lead and blende 1 ton per fathom. In the 10, west of incline shaft, the lode is 3 feet wide, yielding ½ ton of lead and blende per fathom. In the 20 west the lode is 3 feet wide, composed of loose quartz and gossan, with stones of lead. In the 30 west the lode is worth ½ ton per fathom. In the 30, on No. 4 lode, the lode is 1¼ feet wide, containing stones of lead and mundic. In the deep adit level the lode is 1 foot wide, composed of quartz and country.

[For remainder of Foreign Mines see to-day's Journal.]

SULPHUR IN SICILY.—The following is an extract from a report sent by M. Thibaudier, of the French consulate at Palermo, to the Minister of Foreign Affairs:—In the province of Caltanissetta there was altogether about 134 mines at work, which employ 11,000 workmen, and produce 106,350 tons of sulphur. This is almost entirely transported to the coast by means of mules, and is shipped from the ports of Girgenti, Catane, Terranova, and Licata. The price varies from 22 frs. to 50 frs. per ton. The principal mines of the province, either from the development which they have already obtained, or from the importance that they are likely to acquire in a short time, are in the mining district of Caltanissetta,—Trabonello, Gebbria rossa, and Giordano (stretto); the Capo d' Arso and Floristella, in the Castro Giovani district; Gallitano, in the district of Mazzarino; Grottacalda, in that of Piazza; Sociale, in the Montedoro district; Solfare Grande, in the Sommatino district; and in the Riesi district, the mines of Solfara del fiume, Apaforte, and Stincone. Some of these mines already have a production of from 5000 to 8000 tons annually, as Trabonello, Capo d'Arso, Solfare Grande, Grottacalda, and Solfara del fiume. All the mines are capable of great development.

SOMETHING NEW IN ORE WASHING.—Concentration of sulphurets has developed such innumerable varieties of machines that anything quite original in that line was long since deemed an impossibility. But here is a machine invented by Mr. C. Coleman, of Nevada City, that looks like a novelty, and is not without excellent points. A cylinder like a cannon, 20 ft. long and 8 ft. in diameter, its inside in the form of a screw; that is lined throughout with a spiral thread, like that of the female screw. The pulp from a 20-stamp mill is turned into the cylinder at one end, which is quarter closed by a diphragm; the other end of the cylinder is raised a little, and the cylinder is set revolving. At the same time some fresh water is introduced and distributed evenly inside from the opposite end. The operation is that of clean water running from the dirty water, and together out of the cylinder over the edge of the diaphragm at the lower end, at the same time that the screw is moving the heaviest particles along up grade, and towards the elevated end, against the flow of the water, which overflows from riffle to riffle—such being the secondary and rather important role of the screw-threads. Take any single heavy particle introduced, as a grain of pyrites or a nail; it is compelled to travel the whole length of the screw without any possibility of escape, except by being lifted, in consequence of its lighter over the side of its own particular sluice into the next one following; the clear water playing constantly against it, down each sluice; the pipe letting it according to the judgment against the inside of the cylinder on that side which is rising. There being four threads or grooves to the foot (the sluice 3 in. wide and a circumference of 24 ft., the total length of the sluice necessary to be traveled by the particle would be 1720 ft., which is a third of a mile in a straight sluice. The machine is very simple and cheap, being made of wood, the screw parts included. For the latter nothing more is requisite than the nailing on of slats in spiral continuation inside of the cylinder. Less water seems to be required in this than in any machine with which we are acquainted. As to practical results, we know nothing further than the reported successful operation of a machine 6 ft. long and 3 ft. in diameter at one of the quartz mills of Nevada city. Its continuousness of operation, and self discharging, are of undecided advantages. The lumber requisite for a sluice of 1720 ft. would cost, is evident, only about a third as much, constructed in this manner, as if set in a straight line, since the side of the sluice at any one point forms also the side of the next screw or groove compartment; so saving the lumber of one side. On the other hand the machine requires motive-power. A 20-stamp machine, 8 ft. in diameter, costs $300, and is estimated to separate effectually all the pulp that a 20-stamp mill can deliver.—*Scientific Press* (San Francisco).

ALUMINIUM BRONZE.—This composite metal is daily entering largely into industrial uses, and is fast becoming a great favourite with many workers. The best proportions are found to be 10 per cent. of aluminium to 90 per cent. of copper. For colour it is not surpassed by, and closely resembles 18-carat gold, while it is capable of receiving a polish far superior in brilliancy to any gilding. Aluminium bronze may be forged like iron or steel, either hot or cold, and becomes very compact under the hammer. It may be rolled into sheets, or drawn into wire, or tubes of any diameter. Its specific gravity is less than that of iron. This composite is less affected by the atmosphere than any metal or alloy except gold, platinum and aluminium. It is tougher than iron, stiff and elastic, and possesses a number of qualities of the greatest value. It is now principally used for watch movements, as well as spoons, forks, cups, jewelry, but its use is rapidly extending into the more purely mechanical. —*Iron Age* (U.S.)

LONDON GENERAL OMNIBUS COMPANY.—The traffic receipts for the week ending July 16 were 11,806*l.* 6*s.* 2*d.*

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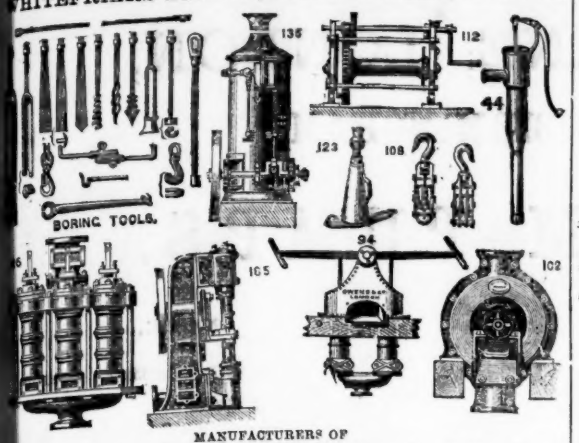

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The above drawing shows the construction of this cheap and handsome roof, now much used for covering factories, stores, sheds, farm buildings, &c., the principals of which are double bow and string girders of best pine timber, covered with ½ in. boards, supported on the girders by purlins running longitudinally, the whole being covered with patent waterproof roofing felt. These roofs so combine lightness with strength that they can be constructed up to 100 ft. span without centre supports, thus not only affording a clear wide space, but effecting a great saving both in the cost of roof and uprights.

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4.—Of the District including East Wheal Lovell, Lovell Consols, North Lovell, and neighbouring mines.
5.—Of the District including Penhalls, Wheal Kitty (St. Agnes), Polbreen and West Chiverton, and other mines.
6.—The Minera Lead Mining District of North Wales.

ALL the MAPS are by the well-known mine surveyor, R. SYMONS, of TRURO, and none of them have been used.

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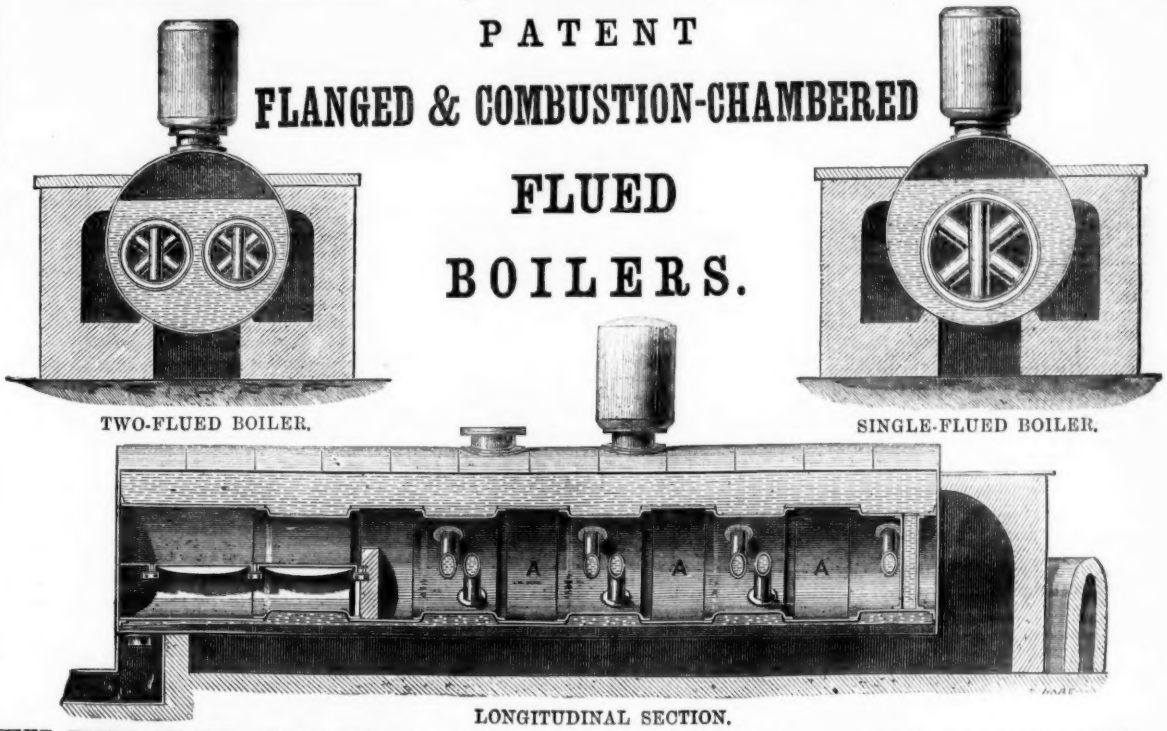

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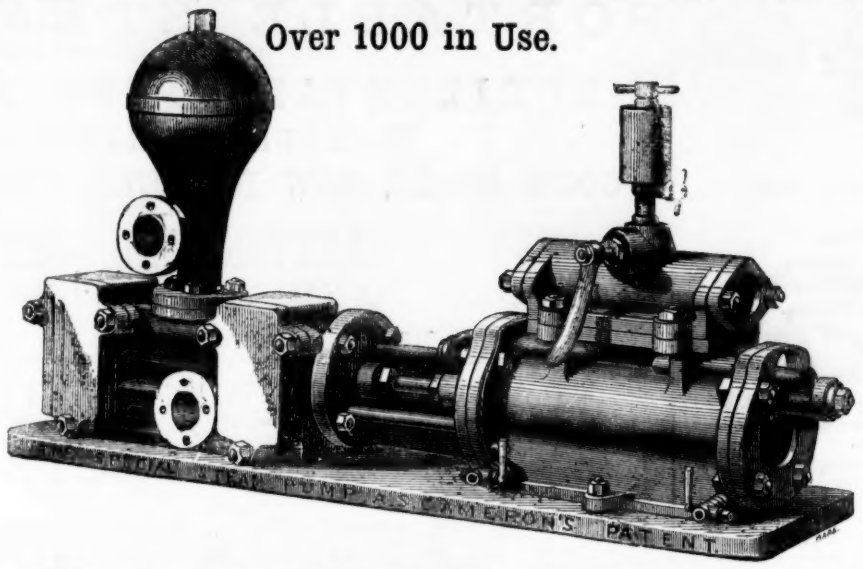

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Black Boy Colliery, Gateshead	1	„	Oakenshaw Colliery	1	„	Thompson, John, Gateshead	2	„
Castle Eden Colliery	2	„	Pease's West Colliery	2	„	Trimdon Grange Colliery	1	„
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Etherley Colliery	1	„	Pegswood Colliery, near Morpeth	2	„	Widdrington Colliery, Morpeth	2	„
Gidlow, T., Wigan	3	„	Pelton Fell Colliery	1	„	Whitworth and Spennymoor Colliery	3	„
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Leather, J. T., near Leeds	2	„	Skelton Mines	1	„	Westminster Brymbo Coal Company	2	„
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Consett Ironworks	2	„	Solway Hematite Iron Company, Maryport ...	1	„	West Cumberland Hematite Iron Company ...	1	„
Castleford Foundry Company, Normanton ...	1	„	Vaughan, Thomas, Middlesborough	2	„	Westbury Iron Company	1	„
Ellen Rolling Mills, Maryport	1	„	The Shotts Iron Company, Edinburgh	1	„			

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The arrangement in the accompanying illustration shows an economical method of draining mines without the expense of erecting surface-engines, fixing pump-rods, or other gearing. A boiler adjacent to the pit's mouth is all that is necessary on the surface; from thence steam may readily be taken down, by means of a felted steam-pipe, to connect the pump with the boiler. The pump may be placed in any situation that may be convenient for working it, and connecting the steam, suction, and delivery pipes.

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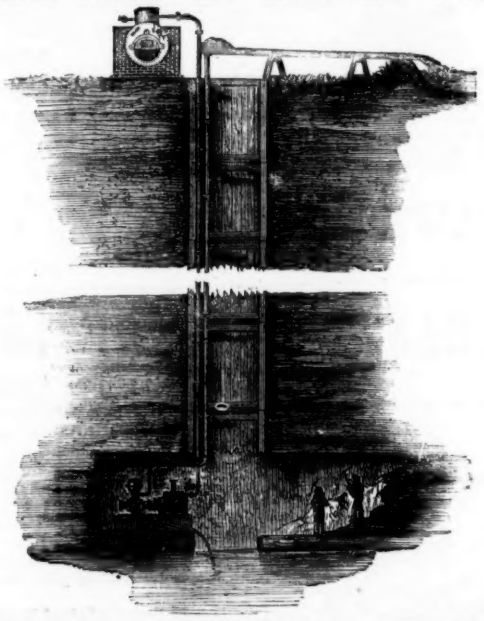

To estimate the quantity of water to be raised by any given size of pump refer to the tabulated list below. It is recommended to use long-stroke pumps where the height exceeds 100 ft., so that the largest result may be obtained with a minimum wear and tear of the pump pistons and valves. The pumps are provided with doors for ready access to all working parts.

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Diameter of Steam Cylinder ..... inches	2½	3	4	4	6	6	6	7	7	7	8	8	8	8	10	10	12	12	14	16	26
Diameter of Water Cylinder ..... inches	1½	1½	2	4	3	4	6	5	6	7	4	6	7	8	6	7	8	10	8	7	6½
Length of Stroke ..... inches	6	9	9	12	12	12	12	12	12	12	12	12	12	18	12	12	18	24	48	24	72
Strokes per minute	100	100	70	50	50	50	50	50	50	50	50	50	50	35	50	50	35	—	—	—	—
Gallons per hour	310	680	815	3250	1830	3250	7330	5070	7330	9750	3250	7330	9750	13,000	7330	9750	13,000	—	—	—	—
PRICE	£10	£15	£20	£35	£30	£40	£47 10	£50	£52 10	£57 10	£50	£55	£65	£85	£70	£80	£100	—	—	—	—

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